

A STUDY IN RAILWAY ECONOMICS.

With Special Reference to the Government
Railways of Tasmania.

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(Note this qualified for the MA)

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INTRODUCTION.

1. This thesis has been undertaken as a first attempt to an analysis of the economics of railway transport in Australia. The first intention was merely a study of the revenue and expenditure of the Tasmanian Government Railways, but in order to get the necessary perspective, it was essential to study the methods of other Australian railway systems as well. This part of the work is contained in the first nine sections of the thesis, which also includes the geographic and historical settings of the problem.

2. In the process of gathering the material for this part of the work a lot of interesting material was met with concerning the capital position of both the Tasmanian and other Australian railway systems and some of the other problems facing Australian railways. It happened fortunately that while the thesis was being written the Royal Commission enquiring into the position of the Victorian Railways was sitting, and a lot of material, much of which will soon be buried in the back files of Melbourne newspapers, became available. For this reason the last four sections were added to the thesis, which therefore naturally falls into two parts. Since the completion of the work the Victorian Commission has issued its report, and as the evidence before the Commission has been referred to in several places, an appendix (No. XIV) has been added dealing briefly with some of the relevant findings of the Commission. The Mechanical Transport Sub-Committee of the Development and Migration Commission is at present investigating the position of the Tasmanian Railways, but has so far published no report, and has not taken evidence in public.

3. The literature of Railway Economics is chiefly American. The outstanding American authority of to-day is of course Professor W. Z. Ripley of Harvard, but there is a number of good writers on the subject, and a great deal more appears to be done in America in the collection of railway statistics than anywhere else. English writing on the subject is very poor, and apart from a couple of early books is almost confined to the writings of the late Sir William Acworth, the best of which appears in official documents rather than in his little textbook. The paucity of English writings on the subject was indeed commented on by Acworth in a review of two American books in the *Economic Journal* shortly before his death, and again by Sir Lyndon Macassey in a review of the last edition of Acworth's book a little later. Two new books have recently been published, one by Stamp and Wood in the Home University Library, which is of necessity sketchy and one in two volumes by G. E. R. Sherrington of London, which is more expansive, but rather shallow. Sir Josiah Stamp's work in the book referred to is confined to an introduction, and one must hope that he will some day present us with an adequate work on the subject.

4. Nothing has been written on Railway Economics in Australia, apart from scattered references to the subject in official papers. But a mass of good information is to be found in the railway annual reports and in the reports of various Royal Commissions, particularly the two reports of Sir Sam Fay and Sir Vincent Raven on the New South Wales and New Zealand railways (1924), and the recent report of the Victorian Commission. There was also a mass of useful information in the evidence given before the Victorian Royal Commission, but unfortunately it seems unlikely that this will ever be published on

account of its great bulk. Several Royal Commissions have considered the position of the Tasmanian Railways from time to time, but the reports are of an exceedingly poor quality and afford little information. Some interesting sidelights on Railway Economics are found, however, in the Parliamentary Papers published in the late 'eighties and early 'nineties of last century concerning the dispute between the Government and the Main Line Company, which ended in the purchase of the Main Line by the Government.

5. Otherwise the sources of information are buried in the archives of the various Railway Departments, and can only be obtained by personal enquiry on the spot. Railway officials are remarkably generous with their assistance to enquirers, but the acquiring of information beyond the published sources naturally requires patient search. Australian railway statistics could perhaps be a little more detailed, and might with advantage be extended, but the system on which they are kept seems excellent. All States have agreed to a uniform set of figures for most series, which makes comparison between them easy.

6. Railway Economics, like most other branches of Economic Science, is still in its infancy, and there is a vast field open for further investigation. The question of a measurement of the need for railway facilities, dealt with in Section 1, for instance, does not seem to have been touched upon by any writer, nor can much information be found in English on the special problems of State railways, apart from discussions on the relative merits of State and private management. This is perhaps natural, considering that the railways of the two great English-speaking countries are privately owned and operated. But they are obviously

of importance to the Dominions, whose developmental policies make State railways a necessity.

7. Discussion on a great many other problems must also be somewhat inconclusive. Theoretical considerations of railway rates, dealt with in Sections VII - IX, form an example of this. *Cost of service* is as yet purely a theoretical conception, and cannot in practice be found with our present information. Nor is it at all certain that it will ever be determinable. The difficulties in finding it are shown by an investigation undertaken by one Australian Railway Department into the cost of carrying a commodity transported in whole trainloads. (Section VII, Sub-section (c)). It is much more difficult to find the cost of carrying a small consignment, which is only a small part of a trainload. Railwaymen will freely speak of carrying goods *below cost*, but there is only the haziest of ideas of what *cost* really means, and the English railways have now adopted a system of making terminal charges, although these are practically inseparable from other costs. A suggestion was made to the Department which undertook the investigation mentioned to embark on another with a view to ascertaining terminal costs, but as it will involve an expenditure altogether out of proportion to any benefit to the Department, the suggestion is not likely to be adopted.

8. Out of the discussion on rates arises the question of how far Australian railways are required to subsidise primary production by carrying produce at low freights. This is also a difficult question, but an attempt has been made to arrive at a definition of a subsidy, and to show that such subsidies do exist. The example used relates to a secondary industry, as it has been found impossible to single out a primary industry

receiving a subsidy, but there is no doubt that many primary industries are in the same position.

9. Unduly great space has perhaps been given to some aspects of railway expenditure, notably Ripley's formula for dividing it. Apart from the original intention of making this the chief part of the thesis, there are two reasons for this: Firstly, the criticism of Ripley's formula breaks new ground, and, secondly, depreciation and the general relation of capital to revenue is becoming an important problem in Australian railway management. The criticism of Ripley's theory is not intended to destroy it; it is, indeed, on too solid a foundation to be destroyed, but some refinements seem necessary in the case of deviations from the average as great as the Tasmanian. The fact that the deviations both above and below the average affect the capital position and have their basis in a desire on the part of managements, whether conscious or not, to obscure the real facts, has been thought of sufficient importance to extend the treatment.

10. Finally there are several matters of importance to Australian railways generally which have not been touched upon, such as the problems of a uniform gauge and of the possibility of a unified Federal control. The reason is that the thesis has been confined as far as possible to Tasmanian railway problems, and such matters have not the importance to Tasmania that they have to other States. Similarly, the whole question of labour relations has been omitted as being too heavy for the space that could be allotted it. A number of smaller matters, for which space could not conveniently be found in the body of the thesis, have been relegated to Appendices XI - XIV.

1. GEOGRAPHY AND RAILWAY CONSTRUCTION.

1. Nothing is more important to the construction of railways in a country than its geographical features, and these may conveniently be considered under three heads:

- (a) Topography
- (b) The facilities for water-transport, and
- (c) Economic resources.

All three have an important bearing on the question of whether railways are justified; the first in its effect on the cost of construction, and the other two on the probabilities of earning sufficient revenue. Russell Smith, (1) for instance, points out that Europe with a slightly larger area and a population four times as great as the United States has 20,000 miles less railways, partly because the mountain systems of Europe are effective barriers to railway construction and partly because Europe does not need railways to the same extent as the United States on account of her indented coasts and wealth of inland waterways.

(a) Topography.

2. Topography has always played an important part in determining transport routes. Progress across any land mass is always along the line of least resistance, a rule that was followed by road-makers before railways were built, and even by those who blazed tracks before wheeled traffic was thought of. Naturally, the shortest and quickest route is always sought, but it may be both quicker and less expensive of effort to take a longer route around an obstacle than to attempt to cross it.

3. This applies to railway construction to a far greater extent than road construction. Steep grades

and sharp curves have to be avoided as much as possible, and this may be costly in crossing a mountain barrier. It means high embankments in some places and deep cuttings or tunnels in others, and the expenditure per mile of railway building in such country is many times that in flat country.

Nor does the extra expenditure cease with the cost of construction. The cost of haulage up steep gradients and around sharp curves is much greater than over level country. It therefore usually pays to avoid such obstacles, if at all possible, and if a mountain range has to be crossed to make such detours as are necessary to cross at the lowest possible levels.

4. Countries with great areas of low, level land are therefore very fortunately situated as far as railway building is concerned. This is the case with many parts of Australia, but Tasmania has very little in the way of level country. An inspection of a contour map will show that a good deal more than half the Island is above the 1,000 ft. level, and a great part of this above 2,000 ft. More important still is the position of the highlands. There is a great Central Plateau, which is the dominant feature of the relief. This plateau has an average of 3,500 feet in the north-west, but falls to much lower levels in the south-east, where it slopes into the basin of the Derwent, which separates it from the Southern Highlands, continuing to the south coast of the Island. The Central Plateau has also an extension running nearly to the East Coast, but this is a great deal lower, although still over 1,000 feet. To the north of these Eastern Highlands lies an isolated formation in the North-East Massif, which takes up the centre of the north-eastern corner of the Island. The lowlands of the Island are therefore

effectively divided into the Derwent Basin in the south-east and a Northern Coastal Plain, including the Central Basin in the north. The latter has by far the greater area. (2) There are less important lowlands on the East and West Coasts.

5. The importance of this to railway building is readily seen. A railway running over the Plateau, say, from Hobart to Burnie, is out of the question; the Plateau has to be avoided. Even a railway running north-south from Launceston to Hobart, as the Tasmanian Main Line, has to cross the Plateau although at a fairly low level. It does, in fact, cross the narrow section connecting the Central Plateau with the Eastern Highlands, which rises to 1,350 feet at Oatlands.

Only in the Northern Coastal plain is railway building comparatively simple, in that there are no great heights to be crossed, but in a country with as broken a surface as Tasmania there are difficulties even here. There are smaller hills and valleys, which only a very detailed contour map would show. One must therefore expect Tasmanian railways to be costly of construction, and figures given in a subsequent section will show this to be true.

(b) Other Transport Facilities.

6. The second drawback to railway construction in Tasmania, namely the possibility of competition from other forms of transport, is perhaps even more important, and is certainly gaining in importance. Firstly, the Island is not great; there are no very great distances in any direction. But the fact that the centre of the Island is occupied by an uninhabitable plateau, means that railways nowhere will be any great distance from the coast. This must of necessity mean competition with water transport.

This competition is of a rather peculiar character. There are only three rivers in Tasmania navigable for a short distance. This is the Tamar in the North, and the Derwent and Huon in the South. Of these the Tamar and the Huon are not in competition with railways; there have in both cases been agitations for the construction of railways, but they have never been built. The Derwent, has, however, provided competition with two railways, the Derwent Valley and Bellerive-Sorell line, and the latter has succumbed to its competitors by water and land.

7. But there is water competition of a different type with the three trunk lines, the Main Line from Hobart to Launceston, the Western Line from Launceston to Stanley, and the West Coast Lines from Burnie to Queenstown. This arises from the proximity of Tasmania to the Mainland, which diverts a great deal of trade to Melbourne and Sydney. There are direct steamers from the Mainland to Hobart in the South; Launceston, Devonport, Burnie and Stanley spread along the North Coast, and Strahan in the West. In the South most of the distribution is done from Hobart by steamer; in the North and West the distances from port are not great, making railway hauls very short. The average haul per ton of goods in Tasmania in 1926/27 was 44.63 miles, compared to 95.01 miles in Victoria.
8. There is still another factor to be considered. Railways are increasingly subject to competition with road transport, and this competition is keenest over short distances. As will be shown in a subsequent section, some Tasmanian railways are so short and so unfortunately situated that they were even exposed to the comparatively inefficient road competition of the early

nineties of last century, and are naturally in a much worse position with present day motor competition. With one or two exceptions there is no important railway station in Tasmania more than 50 miles from a port, and the radius over which motor trucks can profitably operate will get closer to this figure as their efficiency improves and roads are made better.

(c) Economic Resources.

9. The question of economic resources requiring railways is more difficult, and can only be touched upon here. The economic position of Tasmania, in general, has best been set out by Professor Brigden in his Economic Sketch. (3) Without going into detail a few of his chief conclusions may be noted. Tasmania has 0.88 per cent. of the territory of Australia, but only 0.76 per cent. of the occupied area, yet it supports 3.5 per cent. of the population, which relies mainly upon agricultural production. Of all the States Tasmania has been most dependent on agriculture. Its comparatively dense population is explained by the fact that its agriculture is more intense than that of the other States. In Tasmania 1.7 per cent. of the land is under crop, in Victoria 8 per cent.: yet 8.1 per cent. of Tasmania's population are male farm workers, while the percentage in Victoria is 6.3. The proportion of workers dependent on wasting assets other than soil fertility (mining and forestry) is greater than in any other State except Western Australia, and the proportion engaged in manufacture is smaller than that of other States except Western Australia and Queensland.

10. The agricultural population has decreased slightly in recent years, showing that extension of

agriculture is not profitable. Nor is it likely that the proportion of the population engaged in forestry and mining can be increased. The only possibility of increase is in manufacturing production, and this is difficult. Tasmania has to import coal, but is developing sources of hydro-electric power to attract industries. But it has not been very successful, chiefly owing to the distance from markets, and of difficulties of transport. The net result has been a loss of population in recent years, now abating, but not likely to develop into a strong movement the other way.

11. These facts are mentioned in order to show that further agricultural development of the State is not very likely, and that the building of railways in recent years for development purposes has not been very fruitful. It may now be interesting to look at the comparative railway facilities in the different States of the Commonwealth:- (4)

Mileage of Railway:-

	N.S.W.	Vic.	Q'ld.	S.A.	W.A.	Tas.	Aus.
Per 1000 of population:	2.62	2.76	8.62	6.49	13.97	5.12	4.71
Per 1000 sq. miles:	19.62	53.34	11.30	9.54	5.33	40.91	9.56
Per 1000 sq. miles of occ. territory:	21.82	70.90	14.75	17.15	12.75	79.10	16.49
Per 100 sq. miles of area under crop:	85.56	67.65	468.9	64.77	113.6	257.80	108.60
Per £ mill of production:	34.20	46.42	108.20	92.87	167.80	102.10	66.49.

12. It is extremely difficult to compare railway facilities in States with as widely different conditions as the States of the Commonwealth. There is a number of disturbing factors all tending to make any set of figures incomparable. First of all there is the difference of gauge. Can, for instance, the 6,000 miles of

substantial 4'8" gauge railways in New South Wales be compared to the much less substantial railways of Queensland, 6,500 miles of which is of 3'6" gauge and 1,000 miles of 2 feet? The problem becomes more difficult when it is realised that nearly 800 miles of the latter consist of "railways open for special purposes", that is, of the light tramways with which the sugar country is honeycombed, and which are only in use in the sugar cutting season. Tasmania and Western Australia have smaller lengths of similar lines for carrying timber and minerals, but they are of a more substantial nature, and probably in more constant use. Furthermore Western Australia and South Australia have a large mileage of Federal railways, which bear no connection with their occupied territory or production. It is impossible to reduce this heterogeneous material to a common denominator.

13. The need for railway facilities is even more difficult to determine. As has been shown, Tasmania is comparatively well off for water transport, as none of her producing centres is far from a good port, and most hauls are so short that road transport becomes more economical. There are two exceptions to this, namely the mineral and timber industries, whose goods are too heavy to be handled extensively by road traffic.

14. The figures in the table above give the States widely differing positions according to the standard of comparison. Taking mileage per head of population, Western Australia with her enormous territory naturally stands out, and it is impossible to compare her with the three older eastern States (New South Wales, Victoria and Tasmania) with their more compact populations. The same may be said of South Australia and Queensland. On this basis Tasmania and New South Wales are most easily comparable, as they have approximately the same density

of population, namely, 7.59 and 8.19 inhabitants per square mile respectively. Tasmania has nearly twice the length of railway of New South Wales on this basis, and also nearly twice the length of Victoria with a much denser population.

15. Measuring railway lengths on the basis of area, Tasmania has the greatest length per 1,000 square miles of any State except Victoria, which has two and a half times the density of population (19.48). On this basis again, Tasmania has twice the length of New South Wales; reducing the measurement to mileage per 1,000 square miles of occupied territory, Tasmania comes much further ahead, and even passes Victoria. The reason is that while three-quarters of the area of Victoria is occupied, only half of Tasmania is inhabited. New South Wales with a relatively large area occupied (sparsely) by pastoralists, drops further behind. Taking cultivated area as a measure, Tasmania comes still further ahead of Victoria, and nearly holds her lead on New South Wales, but is left a long way behind Queensland with her large pastoral areas and small area under crop.

16. Another rough index possible is that of total production, which eliminates the need for consideration of "density" over area, but it is difficult to get satisfactory figures. The justification of railways lies in their power to earn revenue, present or prospective; present revenue possibilities may be measured by production in a given area, but potential production is far too intangible a conception to allow of anything like accurate measurement. Volume of production would be the best measure, if railways charged a flat rate per ton of freight, but as they actually charge "what the traffic will bear", i.e. discriminate between

classes of goods with high and low values, the total value of production would appear the better measure. This again must be qualified with considerations of distance. Railways are not able to get the same rate for goods that have to travel a long way to market as they may obtain for those going only a short distance, otherwise goods coming a long distance would not be able to compete. As far as State railways are concerned, this tendency is strengthened by the fact that the State may undertake the carriage of goods at a loss over long distances for the sake of the development of distant areas. But it would be extremely difficult to get a corrective for this factor.

17. Figures showing miles of railways per £ mill. of production are given in the table on Page 6, and the method of working out the figures is shown in Appendix 1. It will be seen that the Mainland States are divided definitely into two classes: the two older States with a relatively low mileage in relation to production, and the three less highly developed States with a comparatively great mileage. The reason is that these States undertake the building of railways to develop new tracts of country to a much greater extent than the two older States. The Queensland figure, as has been pointed out, is somewhat inflated by the large mileage of light railways "open for special purposes", but has in addition long stretches of railway running into pastoral country, which is sparsely populated. Pastoral districts, however, seem to yield a fair amount of revenue, particularly in live stock traffic, but also in wool, which pays high rates. South Australia and Western Australia each have long stretches of Federal railways, which bear no relation to their production, being built for purposes of military or political strategy. Western Australia has

more than 1,000 miles of Federal railway and South Australia 453 miles. But even deducting the Federal railways, Western Australia would have a long mileage in proportion to production. This is partly due to an extensive settlement policy, but another circumstance which has led to extensive railway building might be pointed out. This is the fact that profitable mining fields were opened in districts far from settlement, and railway lines were built to these. The result has been extensive pastoral development in areas which, but for the building of railways to mining fields, would not have been opened. As railway building in Western Australia is comparatively cheap, and the railways built are fairly light, they have proved profitable despite these factors.

18. Although Tasmania cannot be classed with these three younger States, being fully as highly developed as Victoria, her railway mileage in proportion to production is higher than that of South Australia, and nearly as high as that of Queensland. While on the production basis a substantial proportion of the mileage in these other States may be deducted as railways built to provide transport facilities for potential production, Tasmania has little in the way of such development to look forward to. Her railways gather length merely because they have to circumnavigate the unpopulated and unproductive Central Plateau. Most of the branch lines built to develop agricultural districts have proved mistakes, either because they have developed nothing, or because water or road transport has proved cheaper.

(d) Summary.

19. Difficult as it is to get an adequate measure of comparative railway facilities between the different

States, one may come to a few broad conclusions:-

- (a) No matter what measure is taken Tasmania has a greater proportional length of railway than the Commonwealth average.
- (b) In proportion to area it is only second to Victoria, which has nearly two and a half times the population per square mile.
- (c) In proportion to occupied area the State has the greatest length of railway of any State in the Commonwealth, and has also the greatest length in proportion to cultivated area, if the exceptional case of Queensland be taken out of consideration.
- (d) In proportion to the value of production, Western Australia and Queensland exceed Tasmania in railway facilities, but both are younger States, and as their railways have not to face the same competition by water and road transport, they cannot be compared with Tasmania on this basis.
- (e) Taking mileage per head of population, Tasmania seems most easily compared to New South Wales, as the two States have approximately the same density of population. For this reason comparison on population and area bases yield approximately the same result, Tasmania showing proportionally twice the length of railway of New South Wales. Against this is the fact that New South Wales railways are heavier than Tasmanian, but they do not have to face the same amount of competition. It may, therefore, definitely be said that Tasmania is far better supplied with railways than New South Wales.
- (f) The general conclusion must be that Tasmania has built railways rather too freely, and that Tasmanian railways for that reason are handicapped in earning power. This conclusion receives added force from other points of view to be considered later.
- (g) The handicap is added to by the fact that the physical features of the State make railway construction comparatively dear, adding to the interest burden the railways have to bear. This will also be further illustrated.

11. THE HISTORY OF TASMANIAN RAILWAYS.

(a) Private Construction.

1. Railway construction in Tasmania was first undertaken by private companies. The first Tasmanian railway opened was a broad gauge (5ft. 3in.) line from Launceston to Deloraine, a distance of 45 miles known as the Western Line. The Western Line Railway Company, with total resources of £450,000, of which £400,000 was in debentures and the rest share capital, started construction in 1866, and the railway was opened in 1871. Only two years later it was taken over by the Government. In 1885 another section of 37 miles to Formby (now Devonport) was opened. This was a narrow gauge (3ft. 6in.) section, and the first section was at the same time converted to the same gauge. This line has from time to time been added to, being extended successively to Ulverstone, Myalla, and finally to Stanley. A number of branch lines have been constructed from time to time connecting the line with inland centres.

2. The second line constructed was the Main Line from Hobart to Western Junction, where it linked up with the Western Line to Launceston. This line was constructed by an English Company, the Tasmanian Main Line Railway Company. Construction was started in 1869, and the line was opened in 1876. The Company had an authorised share capital of £1 mill., of which £451,000 was called up, and in addition raised £750,000 by means of 5 per cent. debentures, on which the Tasmanian Government guaranteed interest. The Company was to run trains right through to Launceston and for this purpose was authorised to use the Government's line from Western Junction to Launceston. As the Main Line was a 3ft. 6in. line, and the Government Line was still a broad gauge line, the Company was authorised

to lay a third rail to suit its rolling stock, and paid a rent to the Government for the use of the other rail and the permanent way with its facilities.

(b) Dispute with the Government.

3. The Company had an interesting history. It was in constant dispute with the Government concerning the amount of the Government subsidy towards interest on debentures. It never paid its way, and had the natural inclination to make the annual deficit as big as possible, as it then increased the amount for which the Government was liable. The Government on its side always looked for trouble, and the result was a never-ending dispute, which led to a great deal of unpleasantness. The details of the dispute are more conveniently dealt with elsewhere, but a brief sketch of its course may be made. The Company consistently put in its accounts for the items in dispute, and the Government just as consistently returned them unpaid. There was a great deal of acrimonious correspondence between the Manager of the Company, and successive Treasurers, which culminated in the Company in 1888 at a meeting of shareholders in London, carrying a resolution asking the Stock Exchange to boycott a Tasmanian Government loan of £1 mill. (1).

4. An extract of the minutes of the Company meeting containing the resolution was forwarded to the Treasurer, and was as follows:-

"In view of the probable issue of a new
"Government loan the Board ordered that
"Mr. Grant (Hobart Manager) be directed
"to inform the Government that the Company
"will be compelled to oppose quotation; and
"further, to give public notice of their
"intention to oppose on the public being
"invited to subscribe to it".

The covering correspondence shows that the Manager and the Directors "deeply regretted" that the shareholders

in their righteous indignation had gone so far; but as the Government had sown, so must it reap. There is quite naturally a little more acidity in the letters of the Treasurer about this time, but the correspondence contains little clue as to what ultimately happened.

5. It appears, however, as if the Government was brought to heel. Only a month later the correspondence becomes milder, the Auditor-General is asked to make another report, and the Government apparently continued payments of subsidies, deducting for the time being the items in dispute. In May 1889, the dispute was taken to Court. The Court, on a very technical point, found that the Government was liable for nearly the whole amount with interest. The Government failed again on an appeal.

(c) Purchase of the Line.

6. By this the Government was evidently heartily sick of the affair, and determined to take the Line over. In May 1889, while the Court was considering the dispute, negotiations were opened. (2). By November that year, the negotiators reached an agreement, by which the Government were to take over at a purchase price of £1,125,000. The assets were then valued in the Company's balance sheet at £1,188,000. The Company decided to accept this agreement, but Parliament refused to ratify it, and put £1 mill. as the maximum purchase price. But the Company would not accept this sum, and negotiations continued. The Government came to the conclusion that although the purchase price demanded was somewhat high, there should be deducted from it the probable deficits which the Government would have to reimburse the Company for. It did not seem to occur to them, that they would probably have to face these deficits even under their own management. Their

advisers certainly made out a good case for savings in running by bringing the railways of the State under one management, and their figures seem to have been borne out to some extent, as the profit on working increased considerably after the Government had taken the Line over. (3). But this might have been expected in any case with the increasing revenue of the Line.

7. Finally a compromise was arrived at, and the Government took the Line over in October, 1890. The purchase price was nominally to remain at £1,125,000, but from this was deducted the amount of the verdict given in the lawsuit against the Government, and the actual purchase price is set down in the balance sheet at the end of 1890 as £1,106,500. (4) It is difficult to find out whether this was a fair valuation of the Line, but it was agreed to by the Government valuer, who was the Chairman of the Victorian Railways Commissioners. There was, apparently, a general impression that the Company made a good bargain, but no definite information is available. What possibly counted most with both parties was that they were tired of the strife in the past, and glad to put an end to it on reasonable terms.

(d) The West Coast.

8. The West Coast lines provide a small chapter of history themselves. There were promising mineral discoveries in this part of the Island in the late eighties and early nineties. Copper and gold was found in the Mt. Lyell district, and silver-lead and tin in the Zeehan and Rosebery districts. Tin had already been discovered at Mt. Bischoff in 1871. The first line to be built was the line from Burnie to Waratah (Mt. Bischoff), which first existed as a wooden horse-tram built by the Van Diemen's

Land Company in 1878. It was converted into a steam railway in 1884, and in 1897 it was taken over on a 99 years' lease by the Emu Bay Railway Company, which finally bought the line in 1926. Shortly after leasing the line, the Emu Bay Company started construction of an extension for Guilford Junction, near Waratah, to the silver-lead fields of Rosebery and Zeehan, and the extension was opened in 1901.

9. It was the intention of the Company to construct a branch line from near Rosebery to Mt. Lyell. The Company had powers to construct branch lines, but obstacles were put in its way. First of all, consent, which had to be sought from the Governor-in-Council, was asked in 1897, when the line to Rosebery was not yet constructed. The Attorney-General contended that there could be no construction of a branch line to a line that did not exist. Secondly, the "branch" would have been about 50 miles long, while the main line was only 88 miles, and the project was more like an extension than a branch. The junction would, in fact, only have been a few miles from the terminus of the main line. The manager of the State Railways reported against it, as he contended that the line would injure present and projected Government lines, and consent was not given. A few years later when the line to Zeehan had been constructed, and consent might have been obtained, the mining boom was over.

10. The first Government line on the West Coast was the Zeehan-Strahan line, connecting the mining fields with Macquarie Harbour. This was opened in 1892, and was for some time the best paying line in Tasmania. In 1896 it earned over 7 per cent. on capital, and over a period of 10 years earned more than full interest on the capital invested, both clear records for Tasmania. But by the end

of the century rates had to be lowered to cater for lower grade ores, with the result that profits dropped to $3\frac{1}{4}$ per cent., and in 1901 the Emu Bay Railway entered competition, and decline was continuous from then. The Emu Bay line certainly got a big share of the traffic, but neither line paid. The Emu Bay Company has never paid a dividend, and has a struggle to pay interest on debentures.

11. The Mt. Lyell field is served by the Queenstown to Strahan railway, owned by the Mt. Lyell Mining and Railway Company. The gradients on this line are so steep that the Abt Rack system had to be resorted to for some distance. The first section, from Queenstown to Teepookana on the King River, was opened in 1896, but as the river at this point is navigable only by small craft, it was continued to the port, the last section being opened in 1899. The line ascends a height of 700 feet in only $2\frac{3}{4}$ miles, a grade of one in 20, and then descends for $1\frac{1}{2}$ miles at a one in 16 grade. It is for this section that the rack-rail is used. Probably this is the best kept railway in the Island, and is, as far as can be ascertained, a payable proposition. But its running is only incidental to the mining operations of the Company, and the separation of accounts is not complete enough to get accurate figures.

12. There is a number of smaller lines, mostly of 2 ft. gauge, serving the district around Zeehan, but these are now of little importance. There were also a couple of larger projects, from the carrying out of which the State has happily been saved. One was the Great Western Railway, which was to be constructed by the Great Western Railway and Electric Ore-Reduction Company with headquarters in London. This line was to run from a point on the Derwent Valley line

to the mining fields of the West Coast, and an Act enabling its construction was passed in 1900, but for some reason or other the project was dropped. The other project was to connect Zeehan by railway with the Western Line at Railton. This project never got very far, but seems to have been one of the reasons for the construction of the Railton-Sheffield line, which was to have been the first section, after it had been turned down by two Royal Commissions.

(e) Other Lines.

13. During the nineties a number of Branch lines were constructed, the most important being the Pingal, the North-Eastern, the Derwent Valley, the Apsley, and the Sorell lines. The three first-named have been fairly payable, and have justified their construction, but the others have never been able to pay working expenses, and the Sorell line has now been torn up. These two lines have been subject to competition with road and water transport since their inception, and were both hopeless failures. The same may be said of the Chudleigh line, the first branch line constructed from the Western line.

14. Between 1900 and 1910 the chief construction was extensions of existing lines, including the Derwent Valley, the North-Eastern, and Western lines. The Sheffield branch as stated above, was also built. Most of these have been more or less justified. But in the next ten years a number of less successful lines were completed. In 1914 the Staverton branch was opened at a cost of £88,888, and brought forth a lament from the Commissioner of Railways to the effect that it would probably not pay working expenses for very many years. The same comment is made on the Nietta, Don-Melrose, and Praeden lines.

in 1917, and none of these lines have paid working expenses. Most of them have now joined the growing list of Tasmanian railways on which the printed timetable gives the simple information that "trains will be run when freight offers," and advises intending passengers to make enquiries concerning the date of the next train. A particularly bad case is that of the Melrose-Barrington extension of the Don-Melrose line. This was opened in 1922, and traffic was suspended last year on the discovery that the average revenue per train was less than £1., and that some trains collected only one or two shillings. In the 1927 report the Commissioner pointed out that only three branch lines were paying working expenses, and asked for serious consideration of closing where running expenses are far above revenue.

15. The Commissioners are also found from time to time to make complaints concerning ^{faulty} construction. The first are found as far back as 1894, and they still continue. In 1920 the Commissioner states that the cost of upkeep is higher than in other States, except Queensland and Western Australia, and attributes this to light rails and poor class of ballast. He also complains of unnecessarily steep grades, and recommends the regrading of the Main Line for a distance of 55 miles from Bridgewater, to avoid the high ground at Parattah.

111. RAILWAY CONSTRUCTION.(a) General.

1. One of the most important factors in railway economics is the large amount of capital involved. The Tasmanian railways have cost £6,485,109, or £30.81 per head of population, and £9,586 per mile of line open. Of this by far the largest proportion is invested in the permanent way, workshops and other buildings, namely £5,283,107, or roughly 81.4 per cent. of the whole, and the rest in rolling stock.

2. It is this large expenditure on the permanent way which distinguishes railway property from most other forms of capital. It is in many cases possible to realise something on the assets in which the capital has been invested, but this is not so with railways. Railway capital is irretrievably lost if it is invested in lines that have ^{no} hope of paying working costs. First of all there is the preliminary surveys of all possible routes, and the careful working out of costs, so as to find the cheapest route. Then land has to be bought from its owners. This is necessarily a big expense in settled countries, but is not so great in new countries, where as a rule most of the land through which railways are built is crown land, but some expense is always incurred. Sometimes the owner demands not only top price for the land, but also compensation on account of the railway cutting his land so as to leave two awkward blocks, one on each side of the line.

3. This expenditure is unavoidable, and what is more it is entirely irrecoverable. This is certainly apparent in the case of the preliminary expenditure, but

it is equally true of land bought, because the first thing the railway does is to make it entirely useless for any other purpose. Flat land and depressions have embankments built on them, and hill-sides are cut. This expenditure on work done on the land is equally irrecoverable. If the railway cannot pay, it represents sheer waste of capital, just as a well sunk without finding water or a shaft sunk without finding ore. Embankments, cuttings, tunnels, culverts, bridges, and platforms are fixed to the spot for ever, and can neither serve any new purpose, nor be taken up and put elsewhere. Rolling stock is on a different footing; that may be shifted anywhere, and will in most cases be just as efficient on one line as another. The Tasmanian railways have an interest bill of £285,255 per annum, or 4.4 per cent. on the capital invested. This sum has to be found in addition to the working costs, before the railways can be said to pay their way. To do this the railway must be fully occupied. Railways are subject to the law of increasing returns, to a remarkable degree, since maintenance and operating costs do not vary very much with traffic. A railway must therefore be built on the assumption that there is enough traffic for it to carry. This is at any rate the case with a private railway, which would not be built unless it was assumed that there was enough traffic for it to pay its way. Private companies do, of course, make mistakes. There are plenty of examples of private railways not paying their way in almost all parts of the world, and Tasmania has the notable example of the Emu Bay Railway Company's line from Burnie to Zeehan, with a branch line to Waratah, built to serve mining fields which petered out before it was anticipated that they would.

(b) State and Private Railways.

4. State owned railways are on a slightly different footing, and particularly is this the case with State owned railways in a new country like Australia. They are built in many cases not to satisfy an existing want, but in anticipation of a future need. In other words, they are often built for the purpose of developing new country. Even so far they have something in common with some private railways. Undoubtedly many American railways have been built in anticipation of future traffic and with little hope of immediate return. In such cases it is usual to grant the railway company land on either side of the road, so that it may benefit by the increment in the value of this land, or some other concession. The most notable example of this is perhaps the Canadian-Pacific Railway. In this case the Dominion Government constructed and transferred to the Company free of charge 714 miles of road out of a total of 3,268 miles, in addition to granting 25,000,000 acres of land and a subsidy of 25 million dollars. (1) But before a private company will build a railway there must be a reasonable expectation of profit, if not at the time of building at least within a comparatively brief time.

5. The State goes a great deal further than this. In the first place the State is not likely to make the same careful investigation as a private company. To a company the railway is itself an end; to a government it is merely a means to an end. To the private company the development of the country is only a means to make the railway pay; to a government the development of the country is the main object. This is important because it has vital effects on the earning power of the two types of ownership; it is much more likely that the government

will make a mistake in calculating the prospects of a railway than that a private company will.

6. The fact that the private company is risking the capital of its own directors is also a powerful brake on optimism, which a government lacks; on the contrary, governments are often pressed into railway building which investigation would show to be of doubtful value, even in a remote future. This factor of political pressure is perhaps over-estimated, but is obviously of some importance. As may be seen from some Tasmanian examples a railway is at times sought (because merely) there is a suspicion that private carriers by road or water are overcharging the producers of a district. In such a case members of Parliament for the districts to be served by the projected railway will combine for the purpose of having it passed, and arguments, however flimsy, concerning the benefit to the people to be served, will usually outweigh apprehensions as to ultimate costs.

7. To the shareholders of a private company these apprehensions stand out much more clearly. First of all they are not concerned with the benefit to the districts concerned. Secondly, they look to at least a reasonable profit apart from interest on the capital invested, as a reward for the risk taken. Thirdly, if there is a loss, it has to be borne by a limited number of investors. The State, on the other hand, does not look for profit; it seeks at the most a return sufficient for working expenses and interest on the capital borrowed. If a profit should be made, there would immediately be a clamour for reduced rates from the public. And if there is a loss, it is not borne by a few investors, on whom it presses heavily, but by the

whole of the tax-payers, each of whom only bears a small part of the burden, and is not conscious of it, because it only forms a small part of the taxes paid. (2) Miscalculation by the State is therefore easier than miscalculation by the private investor, because the private investor looks for a wider margin than the State, and is more likely to be on the safe side.

(c) The Costs of Construction.

8. There is, perhaps, nothing more complicated in railway working than the cost of construction, which will vary considerably with conditions. There is a number of factors to be considered, including the cost of land, the quantity of traffic for which the road is designed, the cost of labour, the nature of the country through which the railway runs, and the amount of double mileage. For these and other reasons it is not necessarily a sign of wasteful methods that there is a high cost of construction relative to mileage. The cost per mile forms an index to the relative interest burden, but affords no just measure of whether the cost has been unduly great. The cost of construction of Australian Government Railways is shown in the following table:- (3)

Mileage, Gauge and Cost of Australian Railways

To June 30, 1926.

State	Gauge	Length of Line	Total Cost £1,000	Cost per Mile. £.	Cost per Head of Population. £.
N.S.W.	4'8½"	5,741	103,675	18,056	44.73
Vic.	5'3"	4,627	68,888	14,887	40.65
Q'ld.	3'6"	6,240	51,555	8,262	58.63
S.A.	5'3" & 3'6"	2,449	25,530	10,216	45.71
W.A.	3'6"	3,864	20,327	5,620	54.18
Tas.	3'6"	673	6,450	9,586	30.81

In Victoria there are 122 miles of 2'6" line, in

New South Wales 39 miles of 3'6", and in Queensland and Tasmania short lengths of 2 ft. lines, but these are not of great importance. In South Australia a little over half the length (1,261 miles) is of 3'6" gauge, and the rest (1,238 miles) of the wider gauge.

9. It will be seen that Tasmania has a higher cost of construction than any of the States with the same gauge of railway, and a cost nearly as high as South Australia, half of whose railways are of a wider gauge. The very high cost in New South Wales and Victoria is due to the wider gauge, the amount of double line, and the cost of the electrification of suburban railways, better rolling stock equipment, and the cost of urban land acquired in recent years for the extension of terminals and for suburban railways in Melbourne and Sydney. Otherwise the cost of land does not play an important part in Australian railway construction; the principal outlay is for construction of the permanent way and rolling stock, and of these the first item is by far the greater. In this, Australian railways differ from those of more settled countries. The only figures available are those of Jeans (4) who states that the average cost of British railways constructed to 1884 amounted to £42,486 per mile and that of the Belgian railways £36,508 per mile. Speaking of this high cost of construction, compared with America, Jeans (5) attributes it partly to the smaller cost of land, partly the less substantial construction, and partly to the smaller length of double line in the United States. In addition America has also the advantage of longer stretches of flat country than Britain, and this will also partly account for the difference between British and Belgian railways. The cost of land he puts down at £4,000 per mile, (6) which seems a fairly low figure, but Acworth, (7) writing

in 1924, seems to accept it as still holding good, and takes it to include other preliminary expenses, such as surveying and expenses connected with obtaining Parliamentary sanction. Ripley (8) quotes the "Railway Age Gazette" as giving the same figure, but applying to cost of land only. He states that the American railways cost about one-half of the Prussian State Railways, and less than a quarter of what the English railways cost, but gives no actual figures.

10. As far as the Australian States are concerned, we may take it, that, apart from the small reservation made, the cost of land and preliminary expenses have been fairly equal, and that the differing cost of construction is mainly due to the terrain. The two states most nearly comparable to Tasmania are Queensland and Western Australia, both of which have the same gauge, and very little in the nature of double lines. As one would expect Western Australia with its long level stretches has by far the lowest cost per mile, while Queensland with some difficult country comes second, and Tasmania, which has still more hilly country to contend with, has the highest cost. The cost in Tasmania per mile is nearly as high as the cost in South Australia where half the mileage is wide-gauge road of a much more substantial nature.

(d) Mistakes in Construction.

11. There should be no suggestion that Tasmanian railways have been constructed at an extravagant figure compared with other Australian railways. Certainly we find the General Manager in 1889 making a bitter complaint:-(9)

"The disregard of financial success, the endeavour
 "to force upon my department lines inefficiently
 "constructed, regardless of consequences, has com-
 "pelled me to refer to the matter. Unnecessarily
 "steep grades, weak section rails, insufficient
 "waterways, inferior timber work, shortness of
 "ballast, and bad class of sleepers, keep our working

But the same Manager admits in his report of the following year that this is not peculiar to Tasmania:- (10)

"Unfortunately, we have fallen into the error
 "common to all the colonies of endeavouring to
 "construct as many lines as possible with the
 "funds at our disposal; the result has been
 "higher cost of maintenance than would have been
 "the case had heavier rails been used. The
 "40 and 43 lbs. sections of rail are far too
 "light for the heavy class of engines necessary
 "to surmount the difficulties of steep gradients."

12. These cheap construction methods have evidently been responsible for a very heavy cost of maintenance. But they are the kind of mistakes that appear inevitable in a new country, where the rate of growth is difficult to visualise. The lack of foresight characterising early Australian settlement may be seen in the congestion in city streets, particularly in the older cities, such as Hobart and Sydney. Certainly railway development came much later, but the statesmen of even those later years seem to have been impressed with the proverb that "sufficient unto the day are the evils thereof," and decided to let posterity take care of itself.

13. We may now pass on to the other class of mistake due to an entirely opposite line of thought, namely over-optimism as to the future possibilities of a district. That such mistakes must be made is clear; that they can be minimised by careful investigation is equally certain. If the decision is left to experts, one would expect a minimum of risk, but not by any means a complete absence of risk. It has already been explained that even the views of experts plus the natural caution of the private investor in interpreting these views are no absolute guarantee against failure, and when the latter is lacking there is naturally less guarantee.

14. Two Tasmanian railways amply illustrate this point, namely, the Zeehan-Strahan and the Zeehan-Dundas railways. Both these were built to serve a comparatively large mining field by connecting it with the nearest port. These lines were built in 1891-94. For the first ten years (1892-1901) the Zeehan-Strahan line earned interest at the average rate of 4.70 per cent., while the railways as a whole only earned 0.87 per cent., and the two next best lines (Main and Western) earned 0.93 and 0.95 respectively. Then there was a decline, starting in 1899, and gaining strength from 1901 onwards. Rates had to be lowered owing to high grade ore being exhausted, and the companies, working on low grade ore, could not pay the rates they had hitherto been paying. In 1901 there is a complaint of the competition offered by the Emu Bay Railway, which runs from Burnie to Zeehan, with the Zeehan-Strahan line. The Emu Bay line is 88 miles long, while the distance of the Government line is only 29 miles, but a later report (1905-6) shows that the shipping freights from Burnie are so much lower, that the combined freight to Melbourne ~~is~~ is cheaper via Burnie, than via Strahan. The complaint is made in a tone suggesting that the shipping companies had made concessions to the Emu Bay Railway to enable it to compete with the Government line, but that may not be so. It is not unlikely that the companies found Burnie a far more convenient port for two reasons. Firstly, the distance is a good deal shorter, and secondly, Strahan has a rather dangerous sand bar across the entrance to the harbour, while Burnie is an easily accessible port. On the face of it, there is therefore a good deal of justification for the lower freights from Burnie. On the other hand, the fact that a great deal of this freight was taken to Hobart for transshipment to Germany lends colour

to the beliefs of the State Railway Manager. But finally the fields almost ceased work, on account of the lower grade material and the dropping of the metal prices, which became too low for profitable working, and neither of the two lines have paid for many years. There has been a slight revival lately, made possible by improved treatment processes, but so far not sufficient to make any material difference.

15. Here is a case of a railway line, the building of which was certainly justified, judged by the prospects at the time of building. The prospects at the time must have looked particularly bright, otherwise two lines would not have entered competition for the traffic. But unforeseen circumstances have curtailed the traffic to such an extent that neither line has made a profit for many years, and there seems to be little prospect of substantial improvement.

16. In the Derwent Valley line Tasmania has an example of the almost opposite type. This line serves an excellent agricultural district, but has competition both from road and water transport. A fair road runs along its whole length and the Derwent River is navigable to New Norfolk, the most important settlement. This line, the first section of which was opened in 1888, (15 miles to New Norfolk), did not pay working expenses until 1902, but has since then shown a small return, and has, as far as any Tasmanian branch line, shown justification for its construction.

17. In a different category are four other lines, constructed in the late 'eighties and early 'nineties; the Bellerive-Sorell, Parattah-Oatlands, Chudleigh and Apsley lines. None of these lines have ever paid working

expenses, and probably never will. In the case of the Parattah-Oatlands line it is not a serious matter, as the line is only $4\frac{1}{2}$ miles in length, and may be justified as a feeder to the Main Line; this is not the case with the Sorell Line, which ends at Bellerive, on the opposite side of the Derwent to Hobart, from where passengers and cargo alike have to be transferred to ferries. In addition the line has to compete with both road and water traffic. The line has now been closed, and it appears that only political pressure kept it open for so long. The farmers appeared to look on it as a convenient curb to the rates charged for other transport, and despite their agitation to have it re-opened, have shown no great desire to make use of it.

18. The Apsley line is a similar case. It was opened in 1891, and has never paid working expenses. Already in its early years the General Manager reports that there is little hope of the line ever paying, since it runs along a good road, and teamsters were able to compete with it. The difficulty in this case is that the line stops about 10 miles short of the nearest settlement at Bothwell. Evidently it was intended ultimately to continue it, but the country past Apsley is too difficult, and the cost of construction would be prohibitive in consideration of the small traffic. The Manager's report for 1896 is so eloquent on the matter that it is worth quoting:- (11)

"I can see no possible prospect of this line paying. The terminus is practically miles from settlement. The cost of cartage by contract to or from the nearest town-ship a distance of 10 miles, is 10s. per ton, whilst the average cost by rail for carriage of goods from Hobart to Apsley, 44 miles, is 13s.5d. per ton; thus the cost of carting ten miles absorbs 42.7 per cent. of total revenue. The intermediate passenger traffic is nominal. The goods traffic once loaded on wagons has to be carried a considerable distance to the railway terminus, and the teams can compete with the railway for the short additional mileage. The average annual loss on working is £1,524. I am of opinion, that, as the line is of very little value to the district, running along an excellent high road for a larger part of its length, it is desirable to stop the annual loss by closing the line".

19. In 1901 another Manager extended the service on the line, and thereby nearly doubled the deficit, but contended in his report that this was made up by increased traffic on the Main Line, to which the Apsley line is a feeder. Figures do not seem to substantiate this claim, as the increase in traffic on the Apsley line was small, (12) and the increase in revenue during the next few years seems to be due to other causes.

(e) The Lessons to be Learned.

20. Here are examples of two lines evidently built quite against the advice of the men who had to shoulder the responsibility of making them pay. Obviously there is a likelihood of managers taking too pessimistic a view, just as the builders of lines are likely to be too optimistic, but the results seem to have justified the opinion of the experts. The Sorell line had to compete with both water and road transport, and the Apsley line must certainly have been an uneconomical undertaking, since the road transport of the 'nineties was able to steal its traffic.

21. An important point emerges from the consideration of the fate of these lines. Both are short lines, the Apsley line being 26 miles long, and the Sorell line 14½ miles. This point, which is growing in importance with the growth of efficiency in road transport, is that the railway is not the cheapest form of transport over short distances, except in the case of heavy traffic, necessitating the movement of large quantities of low value material. This traffic the railway can always get, because it would not be moved without it, but in order to make the traffic pay at the low rates necessarily charged for such traffic, it must be present in sufficient quantity to make the railway work as close to its full capacity as possible. Such goods are coal and metal ores which stand little in

the way of handling charges; but as the supply is usually concentrated at a very definite point, the railway can go right to the point at which production takes place, and deliver it at an equally definite point, such as a steamer wharf, or a treatment plant. This is demonstrated in Tasmania by such lines as the 'Zeehan-Strahan line and the Fingal line, which serves the Mt. Nicholas coal district, and as far as can be ascertained, has paid more towards interest on capital than any other branch line. (13)

22. As far as other goods are concerned, road transport is in most instances the cheaper over short distances, but not necessarily the more economical. The area of production is larger than in the case of minerals or heavy manufactures, and the goods have to be carried to the rail-head by road (or water) transport. At the destination the same thing usually happens; the goods have to be distributed from the railway station to marts or warehouses for sale. Handling charges at both railway terminals therefore play an important part, particularly when only short hauls are concerned, as in this case, they become a large part of the total expense. Road traffic is able to charge railway freight plus these handling charges, which are avoided. The shorter the haul is, the greater the advantage, as the handling charges do not vary with the length of haul. Similarly, the greater the efficiency of road transport, the longer the haul over which it can profitably compete with the railway, providing railway efficiency in haulage or in the lowering of these terminal charges does not increase to the same extent. There are also other considerations to be dealt with in a later section.

23. Since the efficiency in road transport has made

enormous strides in recent years, this factor must be taken into consideration in the treatment of lines constructed in recent years. Since 1914, a number of short branch lines have been constructed and two extensions, one to the Western Line and one to the Derwent Valley Line. The Commissioner in his report for the year ended June 30th, 1917, sums up the position fairly clearly. The capital outlay for these lines to that date had been £508,698, costing £20,020 per annum in interest. The working cost of the new lines based on average cost per train-mile would be £18,860, making a yearly total of £38,880. The estimated revenue for 1916-17 was £10,500, or a net loss of approximately £28,380 per annum. He goes on to say that the development that had taken place in the districts served by these lines, with one exception, had not indicated any prospective improvement in the near future. ~~The~~ The Freolenna line, which seems a particularly bad instance, receives special mention. This line was constructed at a cost of £80,597 bearing an annual interest bill of £3,233, and for the first three months earned £71, while the estimated revenue for the following year was £240 - only a fraction of working expenses. The Staverton Line is a similar instance. Commenting on this the Commissioner states:- (14)

"If it is the policy of the State to build such railways, the taxpayers generally must be prepared to face an ever-increasing deficit. With the lines that are at present under construction and projected, it is my opinion that at no distant date, notwithstanding the utmost efforts of the management towards economy, the annual loss will reach £100,000. This being the position, it becomes of paramount importance that when new railways are in contemplation, public men shall give consideration to the question of the maximum annual loss the State can afford on its railways".

The estimated loss was exceeded by 30 per cent. two years later, and in 1921-22, the Commissioner revised his estimate to £150,000 per annum. The average annual loss since then has been £245,544.

(f) Causes of Errors.

24. It appears beyond doubt that Tasmania has from time to time made quite considerable blunders in railway construction. In the first section it was pointed out that Tasmania must on the whole be considered to be better off for railway facilities than the other States; she has built developmental railways on a far bolder plan, but the expected development has not resulted; in some cases, one might say that the extension of settlement that has taken place, would probably have been undertaken whether the railways had been built or not. There are, of course, railways, the failure of which no amount of foresight could have foretold or prevented. Of this character are the West Coast railways built to serve the Zeehan and Rosebery mining fields, which at the time must have seemed far more permanent than they have proved to be, otherwise there would not have been two railways built, and another two projected to serve them.

25. But a great many Tasmanian lines are the results of clear mistakes in judgment, due, generally speaking, to one of two causes. The one is disregard for competitive forces, and the other over-optimism on the part of governments and their followers concerning Tasmania's industrial future. The two causes go together, but will, as far as possible be treated separately.

26. Competition in transport is certainly keener now than when many of the non-paying lines (15) were built, but water competition existed then, probably to the extent that it does now. There is only one factor which might have intensified it. Hobart had

once much better communication with England and Europe, until the War, the opening of the Panama Canal, and the Commonwealth Navigation Act conspired to deprive the port of them. German ships called, and have not taken up the running since the War. Two shipping lines came from England via the Cape, and returned via New Zealand and Cape Horn, calling at Hobart, until the Panama Canal became the shortest route between Liverpool and New Zealand. Most other lines made calls in the fruit season, and do so now, but the Navigation Act prevents them from doing interstate trade, and the number of ships calling is therefore more strictly rationed. Possibly Hobart with all this shipping had a greater share of the distributing trade than it now has. Melbourne certainly has become the chief distributing centre for Northern Tasmania of overseas goods, but it is difficult to say how much of this it has taken from Hobart since the War.

27. Road competition is of a different character. It has largely arisen since many of the railways were built, and could not have been foreseen at that time. But one must bear in mind such lines as the Apsley Line, with which the slow-moving traffic of thirty years ago could compete. More will be said of transport by road at a later stage, but it is important to note that road traffic is proving itself cheaper on short hauls, and that owing to the peculiarities of water competition, all Tasmanian hauls are short. The longest hauls in Tasmania probably consist of Tasmanian coal, and this is such a low grade product that, in order to compete with Newcastle coal, it has to be hauled at an extraordinary low rate, which cannot possibly pay.

28. The other cause of mistaken judgment is equally serious. A great many of the lines have been built for political reasons. All countries with State railways have suffered from this cause, but parochialism has aided in Tasmania. There is a record even of a member of Parliament asking the Minister for a return showing the mileage of railways in each electorate, with the obvious object of pointing out that his electorate had not had its share. There has been little in the way of safeguards against extravagance in this direction, and there are instances of lines built despite the opinion of experts that they were not justified.

29. One of these is the present railway from Railton to Roland, commonly known as the Sheffield line. This is not the worst of the branch lines, but does not manage to pay working expenses. A Royal Commission sat in 1902, and reported against the project to build a railway from Railton to Wilmot, a little further than the present railway goes. The Commission came to the conclusion that this district should be developed by light tramways running where possible on one side of existing roads, and even these should not go more than 12 to 15 miles from the seaboard. Another Commission was appointed only two years later, and also came to the conclusion that the whole matter should be referred back to the Engineer-in-Chief for a report as to the cost of the lightest possible railway of the standard gauge, to be constructed only a little over half the distance of the proposed railway. Nevertheless the line was built.

30. The building of the later lines seems even less excusable in view of the fact that the estimates of the Railway Department show them to involve large losses. The Commissioners in their reports have certainly not failed to draw attention to the deficits to be expected, as extracts quoted above will show. The Commissioner in his 1922 report again touches on this matter, and throws out the suggestion that no further construction should be undertaken for fifteen or twenty years. In 1927 another Commissioner points out that only three of the branch lines, namely the Derwent Valley, Fingal and North-Eastern lines, pay working expenses, and asks that the worst of the others should be closed.

(g) Summary.

31. The chief conclusions of this section may now be summarised:-

1. One of the most important factors in railway transport is the large amount of capital invested. The largest amount of railway capital is invested in permanent way and works.
2. This large expenditure is unavoidable, and once invested is irrecoverable, as it cannot be used for anything else. A railway must therefore be built on the assumption that there is enough traffic for it to carry, and errors of judgment involve the loss of the whole capital.
3. Such errors of judgment are quite possible with private railways, but they are much more likely to occur in the case of State owned railways, as the State is often prepared to undertake enterprise which private companies could not be induced to undertake. There is also the further factor that private companies will look for a higher return on capital than the State, making the chance of miscalculation smaller.
4. The cost of construction of railways will vary a great deal with local conditions, the chief factors being the cost of land, the gauge of railway, the cost of labour, the nature of the country and the amount of double mileage.

5. The cost of Australian railways is smaller than the cost of railways in older countries, chiefly on account of the cost of land, and large amount of double track in the older countries. Tasmanian railways cost more per mile than other Australian railways of the same gauge, on account of the difficult terrain.
 6. One fairly common mistake in early Australian railway construction appears to be a total disregard for future requirements, by construction of lines that were too light and badly graded. Tasmania has suffered considerably from this error.
 7. Tasmania has a large mileage of lines, the construction of which has not proved to be justified. This is partly due to over-optimism as to possible future development of the areas to be served, and partly to the development of road competition. Some of the former could have been avoided with a little care, but road competition is largely an unforeseen problem, from which Tasmania is not the only sufferer.
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IV. RAILWAY EXPENDITURE.

(a) Divisions of Expenditure.

1. Railway expenditure, like the expenditure of a great many manufacturing industries, does not vary exactly in proportion to traffic. Railway transport is an industry subject to the law of increasing returns; that is, the lowest possible cost per unit of output is only reached with the full utilisation of the plant. This is due to the fact that there is a large expenditure which has to be taken quite independently of the amount of traffic. Writers on railway economics therefore divide expenditure into "constant" and "variable".

2. One very obvious "constant" cost is that of interest on capital. This will not vary until the extension of the traffic is too great for the facilities first provided. It will then rise, and again remain constant until still further facilities are needed. The fact that this is more or less a constant item finds expression in the division of American railway accounts into "fixed charges" and "operating expenses" the former item including interest on debt and capital obligations on leased lines. As will be shown later, this is not a small item. In the aggregate it amounts to 27 per cent. of the expenditure of Australian railways, and in Tasmania it has reached 36 per cent. of the total.

3. But this is not the only "constant" cost of railways. There is also a large element of "constant" expenditure in what the Americans call "operating expenses". The best known formula for dividing this class of expenditure into "constant" and "variable" is that of William Z. Ripley. (1) Ripley's formula states that "more than one-half of the actual operating expenses are independent of the volume of traffic", the other half varying directly in proportion to traffic. It is the object of this section to analyse these operating expenses

and to test Ripley's formula in the light of Australian experience.

4. The working expenses on Australian railways are divided on a standardised plan into the following heads:-

1. The maintenance of way, works and buildings.
2. Rolling Stock: {a} General Superintendence
 {b} Maintenance
 {c} Examination and Lubrication.
3. Locomotive Power.
4. Transportation and Traffic.
5. General Charges (Expenses of Administration).

In addition there is a number of other charges, which vary from State to State, such as contributions towards depreciation, renewals, superannuation, accident, fire insurance and other funds. Some States undertake expenditure under some of these heads yearly; others only in good years. The various heads may now be studied in detail. Particulars of the expenditure under these heads for the Tasmanian Government Railways will be found in Appendices III. and IV; for the Emu Bay Railway in Appendix V. and for the Mt. Lyell Railway in Appendix VI.

(b) Maintenance of Way and Work.

5. One of the largest items is that of maintenance of way and works expenditure, which forms 23 per cent. of working expenses in Australia as a whole, and nearly 28 per cent. of working expenses in Tasmania. This item shows up very clearly the difficulty generally experienced in separating "constant" expenditure from "variable". It is not possible to get a very clear view on the matter, but an analysis of the items involved will help to form an opinion. The following abstract of Tasmanian railway accounts for the years ended June 30th, 1926 and 1927 will show the items involved:-

		<u>1926.</u>	<u>1927.</u>
1.	Superintendence	5,710	5,342
2.	Stationery, Printing and Advertising.	21	38
3.	Stores Expenses	1,050	770
4.	Maintenance and Renewals of Permanent Way.	89,425	88,383
5.	Fences, Gates, Cattle Guards, Roads, Crossings, Signs, etc	5,248	5,836
6.	Slips and Flood Repairs..	268	385
7.	Bridges, Culverts and Drains... ..	9,471	6,806
8.	Signals and Interlocking.	1,517	1,796
9.	Telegraph and Telephone Lines and Instruments... ..	2,656	3,894
10.	Piers and Wharves..	4	0
11.	Weighbridges, Scales and Cranes	474	1,556
12.	Buildings, Platforms and Fixtures	8,349	9,151
13.	Stock Yards	365	514
14.	Water Supply	769	328
15.	Machinery, Tools and Supplies..	2,794	2,687
16.	Injuries to Employees and Others	555	587
17.	Other Expenses	17	76
18.	Proportion of Deferred Renewals	6,142	6,142.
<u>Totals</u>		...£134,835.	£134,291.

6. Of these 1, 2 and 3 may be termed pure overhead costs, which will not vary to the same extent as the total, if at all. Items 5, 6, 7 and 9 will depend more on the weather than on traffic, and this is, to a great extent, true of items 4 and 12. Certainly these are not entirely dependent on traffic, and there are certainly degrees to which a railway track, like a road, may be kept in repair. This applies to an even greater extent to buildings, which may be kept with the scrupulous care of the best city buildings, or may be allowed to assume the appearance of barns on a neglected farm. These two items accounting for more than two thirds of the total, this will become of importance to the argument to be advanced. How much of the repair to the permanent way is due to wear and tear, and how much is due to weather conditions is difficult to say. On a busy main line rails will wear rather than rust out, but on such lines as the three or four Tasmanian branch lines which have not enough traffic to stand a regular weekly train, one would

come to the conclusion that wear had hardly much to do with maintenance of rails. Sleepers will not wear; except with very heavy traffic, and on certain kinds of ballast; they rot, and the same is substantially true of fences and culverts.

7. It is therefore difficult to come to any very definite conclusion as to how much of permanent way repairs is due to traffic. Sir William Acworth rather loosely estimates it under British conditions at less than two-thirds, ascribing the rest to causes entirely independent of traffic. Ripley, on the other hand, estimates only one-third of this expenditure to be due to traffic, under American conditions. Considering the difference in the amount of traffic and the speed of trains one would feel inclined to say that under Tasmanian conditions certainly no more than one-third of the expenditure has anything to do with the extent of the traffic. This, like the estimates of Acworth and Ripley, is little more than a guess. But Australian railwaymen generally seem to incline more to Ripley's estimate than that of Acworth. There are some of the items with which traffic has quite obviously nothing to do, as the three first and the sixth items. But items 5, 7, 12 and 13 must be almost equally independent of traffic. Fences, gates, etc., are not worn out by traffic, their decay is due to wind and weather. This must also be true of culverts and drains, and to a large extent of bridges, although the latter will suffer by the shaking of traffic. Buildings, platforms and stock-yards will hardly suffer much by traffic. In the 1927 expenditure this gives a total of £28,842, or $21\frac{1}{2}$ per cent. of all maintenance of way expenditure, which is not affected by traffic at all.

8. The largest item is No. 4, Maintenance and Renewals of the Permanent Way. With this may be coupled the last item of deferred renewals, which consists of maintenance done in previous years and written to a suspense account. These two together total £94,525, or a little over 70 per cent. of the whole. There are three chief items, ballast, sleepers, and rails, and all three items will vary to some extent with traffic. Ballast needs packing as a result of the jolting and shaking of traffic, but by far the greater portion of ballasting is the result of ballast being washed or blown away. Sleepers usually rot rather than wear, (3) but they will wear with particularly heavy traffic. A Victorian expert explained that on some Melbourne suburban lines this was the case. The traffic shakes the rails and with it the spikes holding the rails to the sleepers, wearing the spike holes. They may be re-spiked once or twice, but will wear out at this point before the sleeper as a whole is unfit for service. The same expert told also of experiences with certain kinds of sandy ballast, which will make the sleeper wear as much as an inch along its whole length, necessitating its renewal while it is still sound. On the whole, however, sleepers will not wear away with traffic.

9. The need for the replacement of rails will vary greatly with the conditions under which they are used. Rails partly wear away, and partly rust, but in some cases the effects of wear will be much greater than in others. Rails on curves will wear much more quickly than on straight stretches, and their replacement is due more often to wear than old age. On lines with very heavy traffic, such as the suburban lines of large cities, rails will also wear

before they rust out. But on the large majority of Australian lines wind and weather will play a big part in their destruction. Conditions vary so much that it is almost impossible to get anything like an accurate estimate of the degree to which traffic wears out rails. At one end of the scale there are lines like Melbourne and Sydney suburban lines with more than a hundred trains a day, and at the other end Tasmanian branch-lines which do not average a train a week; between these there is an infinite variety of traffic density. But over some of the longest stretches the traffic is light; the heaviest traffic only covers short distances. A medium is probably struck on the trunk lines linking Australian capitals, which have moderately heavy traffic.

10. There are two other items not yet mentioned. One is that of tightening up joints, which is due to the shaking and jolting of traffic, and is therefore to a large degree "variable". The other is that of weed destruction on the permanent way, which has nothing to do with the traffic at all. This is a very big item on some lines. In Victoria, for instance, this item of expenditure is heavy. The winter climate is conducive to growth, and in the dry months of the summer the weeds become tinder for bush fires unless they are removed. In Tasmania this danger is not so great, and the same amount of money is not spent on the work.

11. It has already been mentioned that there are degrees to which a road may be kept in order, but it is perhaps difficult to realise the amount of elasticity possible in the conception of "fair" maintenance. It is easily enough seen in the case of buildings. Some of the more prosperous railway systems in Australia keep their stations in perfect

order, building substantial structures, which are not allowed to show signs of decay. The Western Australian railways for instance, have during the last few years been replacing wooden country station buildings with fine brick structures. In Tasmania, the railways have been so badly off, that they have not been able to afford proper upkeep of their buildings. Even the city stations of Hobart and Launceston are crumbling with age. Upwards of fifteen years ago both cities were promised new buildings, but the agitation then started has long since died out, and the old ones still stand, and are likely to stand for years to come.

12. And like buildings, so may the permanent way, including bridges, be made to outlast a normal life; the degree to which the permanent way is kept in order will depend very largely on the speed desired. A road may be perfectly safe at a speed of 30 to 40 miles per hour, and highly unsafe if anything more is attempted. The engineer who has to certify to the safety of the road has therefore also the power to order reduced speeds unless he is allowed the expenditure he thinks necessary. Where speed matters, the expenditure will therefore be kept higher than where a few miles less per hour is not of great concern to the management. Poor railways will lessen speed, because they cannot afford the upkeep of the permanent way to the standard demanded by higher speeds. There is one Tasmanian railway, which well illustrates the point. On this line, which is privately owned, it is not unknown for sleepers to be so rotten that the weight of the engine forces the rails apart, the wheels dropping between them. But as the speed of the train is regulated with an eye to such occurrences, nothing much happens, except that the train is pulled up with a rather uncomfortable jerk, and that there is some delay while the engine is jacked up and the rails

put in place again. Such an extreme case is fortunately not often met with, and while one may treat it with the derision it deserves, it illustrates the point.

13. Another and somewhat different case is that of a rather long bridge, the longest in Tasmania, spanning the river Derwent at Bridgewater. The bridge was due for renewal in the early years of the century, but as no money was available, a new bridge could not be built. There was a road bridge in better condition running alongside the railway bridge, and this was converted into a railway bridge, the old bridge taking the road traffic. This was in 1908, and Railway Commissioners have for some time hinted that a new bridge must soon be built, but funds have been low, and it still lasts. This year it is proposed to strengthen it sufficiently to make it last another fifteen years, when the expenditure of providing a new bridge must be undertaken.

14. These examples serve to show that although railway maintenance expenditure should be fairly inelastic, it may be given a great deal of elasticity. It certainly is inelastic if "maintenance" is taken to mean the upkeep of the road to the standard to which it was built; that is, if it is maintained so as to suffer no depreciation. If this is done there will be a large element of "constant" cost in it. But it may be made to vary more with traffic if the administration lacks the necessary funds to keep it in perfect order.

(c) A Modification of Theory.

15. The general theory of expenditure, as already stated, is best exemplified by Ripley's formula, and Ripley considers two-thirds of maintenance of way and works expenditure to be "constant". It appears from a bewildering mass of data on the subject that this is

substantially true of railways which have sufficient traffic to afford a fair standard of maintenance. But where traffic is not sufficient some modification of this general theory seems essential.

16. Tasmanian figures for maintenance show a rather curious result. In order to prove the relation, if any, between traffic and the various types of costs the figures shown in Appendix VII were taken out. These proved rather confusing owing to the sharp increase in prices over recent years, and were therefore converted to 1911 prices. As wages form by far the most important part of the costs, the cost of living index numbers for six Tasmanian towns were used. These are not prepared for years before 1912, and this therefore must form the limit of the table, although a longer series of years would be desirable. It will be seen in Appendix VIII. that the figures for maintenance per train mile were still somewhat confusing, going down steadily for five years, and then taking a sudden jump, only to fall steadily again during the next five, and repeating the process in the last six years. This leads to the conclusion that maintenance is allowed to fall behind on occasions, so that a great deal has to be made up in some years for omissions in others. To get over this the figures were reduced to a five years running average. When these figures were plotted on a graph, they seemed to show that maintenance costs in Tasmania go up faster than traffic, although the results even after the smoothing out were too erratic to give anything like an accurate picture.

17. There was only one conclusion to be arrived at, namely that as far as the Tasmanian railways are concerned, maintenance costs bear no relation to the amount of traffic whatever. Other means of determining the factors that govern these costs had therefore to be found, and resort was

had to gross earnings. These will be found in Appendix 1X. compared to three groups of costs. In order to make comparison more easy, gross earnings and maintenance costs were reduced to index numbers with 1891 (1000) as basis in both cases. When these were plotted on a graph, they showed a remarkable degree of correspondence. (4)

18. The graph will need a little explanation. In the eleven years from 1891 to 1901, the two lines run very close together, and then the gap gradually widens, but from 1914 onwards the two lines are almost parallel. In other words, the expenditure was a greater percentage of earnings in the early years. One possible explanation of this is found in the annual reports of the time. Reference has been made elsewhere (5) to the complaints of early managers concerning flimsy initial construction, and it is more than likely that maintenance costs in the early years were extraordinarily high on this account, and that it was possible to slacken off owing to gradual replacement with better equipment. The reports certainly do show that heavier rails and better class of ballast and sleepers were substituted as fast as practicable. This is a possible reason for the gradual dropping of maintenance expenditure after 1903; another may be a change in policy on part of the management. The perpendicular lines drawn through the two curves show the years in which changes of management took place, and there appears to be a fairly definite indication of change of policy on at least two occasions.

19. It must also be remembered that the choice of base year is purely arbitrary, and that a different choice would have given closer correspondence in another part of the two curves. Had, for instance, the year 1915/16 been taken as base, the two lines would have run almost together from there onwards. The first year was chosen because it did not appear

to matter very much what year was made the base. This statement is merely made to guard against the possibility of regarding any particular period as showing "normal" expenditure.

20. With the qualifications noted as to changes in management involving changes in policy, the figures shown lead to a very definite conclusion. It appears that there is a substantial correspondence between gross earnings and expenditure on maintenance, and that the latter is governed not by the magnitude of the traffic, but rather by "what the traffic will bear". If the railways have had a good year, the management is encouraged to spend more on maintenance; if the year has been a lean one, the management will look for means of retrenchment, and find this highly elastic expenditure the most convenient.

21. Expenditure on the non-payable Tasmanian branch lines mentioned, would naturally only be the absolute minimum compatible with reasonable safety in any case, and that on lines with slightly more traffic would probably vary according to the length of the purse. Only on main lines would a comparatively large amount of work be done, but also here the degree of order might vary to a very large extent. Rails and sleepers may be left a little longer than is the practice on more prosperous roads; bridges and buildings may be made to outlast that which elsewhere would be considered their normal length of life. The examples quoted are to serve to show that the degree of maintenance may vary very considerably, not only over short periods, but in the long run. The conception of what is a fair standard will vary with the outlook of the management, and this in turn will naturally be affected by the amount of money available for the work. There is a lower limit

set by considerations for safety, and an upper limit at the point at which the road, buildings, and works suffer no depreciation from lack of attention. The lower limit has been shown as somewhat elastic, and even the upper limit is not perfectly rigid. Between the two different limits, there is a wide range in which expenditure seems to be almost entirely covered by earnings; above the upper limit the accepted theory may hold good, that maintenance costs will vary to a much less extent than traffic, i.e. will decrease per traffic mile. Dr. O. M. Lorens, Chief Statistician of the United States Interstate Commerce Commission (6) found this to be true after an investigation covering eighty of the chief American railways.

22. Here again a difference must be noted between private and government owned railways, particularly in regard to the lower limit to maintenance expenditure, namely public safety. On a non-paying line, maintenance expenditure, being the most elastic, will be a competitor with return on capital. It is even questionable whether safety versus profit, known to monetary theorists as "the banker's dilemma" is not equally the dilemma always facing the railway manager, but it certainly is a problem to be carefully weighed by the manager of a non-paying line. It is only natural that to the manager of a non-paying private line, the clamour of shareholders for dividends should sound louder than that of the public for greater safety and comforts. To the manager of a State railway, the problem will have a different complexion; to him the return on capital will possibly appear to have far greater elasticity. The public clamour for safety and comfort will be a far greater consideration than the feeble voice of the taxpayer for relief, and will be strengthened by the knowledge that relief from taxation may be sought

in many other directions.

23. Tasmania has a good example of a non-paying private line in the Emu Bay Railway Company's line from Burnie to Zeehan. This line was built, like the Zeehan-Strahan government line, to tap the supposedly rich mineral deposits of the West Coast, but was not opened until their glory had departed, and has consequently never paid a dividend. In late years, it has even had difficulty in paying working expenses, and at the same time satisfying the claims of debenture holders. In such a case it is only natural that maintenance expenditure should be kept to the lowest possible limit; there is, in fact, no other option, as a higher maintenance expenditure would impair solvency. The result is discomfort to travellers, but they are few, and as they have no other means of transport, they bear it in comparative silence.

(d) Rolling Stock Maintenance.

24. The position in regard to the maintenance of rolling stock is not very different. The items under the headings of General Superintendence and Maintenance of Rolling Stock for the Tasmanian State Railways are set out in the last Annual Report as follows:-

	<u>1926.</u>	<u>1927.</u>
General Superintendence	2,205	2,215
Stores Expenses	2,887	2,282
Maintenance of Locomotives.	41,480	41,410
Maintenance of Coaching Stock	13,164	13,639
Maintenance of Goods Stock.	10,212	10,356
Maintenance of Motor Stock.	711	1,842
Examination and Lubrication of Coaching and Goods Vehicles	1,841	1,747
<u>Totals</u> ...	<u>£72,500</u>	<u>£73,491.</u>

25. This item is not as important as that previously dealt with but nevertheless constitutes about 14 per cent. of total expenditure. Here again one would not expect the

expenditure to increase substantially with traffic, but it will possibly keep more even per traffic mile than expenditure on the maintenance of the permanent way and works. A great deal of the repair work will be due to wear, but some will also be due to the ravages of time and weather. Ripley estimates half of this expenditure to be "constant" and half "variable".

26. Comparing the figures for rolling stock superintendence and maintenance per train-mile with the number of train-miles run, they will be found to decline slightly with increase in traffic. The actual expenditure per train-mile for the years 1913/14 to 1926/27 will be found in Appendix VII, and Appendix VIII shows the same figures reduced to 1911 prices. Unfortunately figures for the years prior to 1913/14 are not available, as they were in previous years shown only as part of the expenditure of the Mechanical Engineer's Department, including also Locomotive Power expenditure. But for the 14 years they are available the figures show what would be expected, namely, a decrease per train-mile with increasing traffic.

27. Here again, however, the necessity for retrenchment has possibly played a larger part than any other consideration. The figures set out in Appendix X and Graph B show that this expenditure has an even closer relation to total earnings than that on permanent way maintenance, and enquiries from railway officials have confirmed the view. A great deal of the rolling stock has become obsolete, because there has not been enough money to replace it with more up-to-date material. This is true both of locomotive and passenger coaches. Locomotives are kept in service because they are not actually worn out, although many of them are completely obsolete, and many more obsolescent. There

are carriages which have been in use almost since the railways were started, and still do service of a kind because the management considers that it cannot afford to renew them. They naturally do not conform to present-day ideas of travelling comfort, but as they are only used on non-paying lines or are pressed into work on main lines during peak periods, no appreciable harm is done.

28. The inventory of locomotive stock in Tasmania shows that among locomotives still in service, there are two veterans which entered the service in 1874 and 1875, and that more than a third of the present stock was built between 1885 and 1890. The normal life of a locomotive is usually considered by engineers to be about 25 years, or at the most 30 years. The Victorian Railways' Commissioners recently accepted the latter as an absolute limit. But over half the Tasmanian stock is over this age, and there are only 21 locomotives out of 89 which will not reach it within a few years.

29. The Tasmanian figures for rolling stock maintenance show a striking contrast to the figures for the best English railways. Sir William Acworth (7) quotes the accounts of the Great Western Railway for 1923. These show a total capital expenditure of £144 mill. of which £19.6 mill. (13.6 per cent.) represent rolling stock. During the year the railway spent £4.25 mill. on maintenance and renewals of rolling stock; that is, over 21 per cent. of its capital value. In contrast to this the Tasmanian railways in 1926/27 spent £73,000 on rolling stock with a book value of £1,192,000, that is 6.1 per cent. on capital value. But it should be pointed out that the figures are not strictly comparable. In the first place, Acworth points out in another part of his book that capital figures for rolling stock on English railways bear little relation

to actual cost or value, as a favourite method of providing for depreciation of railway property has been to add to and improve rolling stock out of revenue. In Tasmania on the other hand, the hand-to-mouth existence of the railways has led managements to charge to capital what could not be got out of revenue. Furthermore, until this year nothing has been provided for depreciation at all, so that the Tasmanian figure is obviously inflated. Secondly, Acworth does not always seem to choose his figures with due regard to averages! As he takes the figures of different railways to discuss different forms of expenditure, there is little chance of checking his figures, and 1923 on the G. W. R. may have been an abnormal year.

30. But his next point is important, if his statement is correct. He states that the G. W. R. each year spends as much in maintaining rolling stock with a book value of £19.6 mill. as it does on the maintenance of permanent way and works set down at £120 mill. Acworth points out that the difference in rate clearly implies more than a difference in the character of the property, and that much of it is due to replacement of stock that is obsolete but not by any means worn out. Again it must be remembered that the first figure is seriously deflated, but it is deflated by the very fact that the expenditure on it is high. Different as the two sets of expenditure are, one common point seems to emerge. That is, that rolling stock becomes obsolete long before it wears out, and therefore expenditure on it will be to some extent independent of the work done. Acworth also makes another point, which would seem to be of even more importance in Tasmania than in England. Wear and tear is the result of movement. Engines, carriages and trucks will deteriorate practically as fast whether they run lightly or fully loaded. The result is that lines with heavy traffic

have an important advantage over lines in poor districts, of which Tasmania has a large mileage.

31. Tasmania is making up for poor returns by spending a minimum on rolling stock maintenance, but it is naturally a handicap to efficiency. Far better results could be got from expenditure on haulage if old locomotives could be replaced by modern engines with labour saving devices and a far smaller coal consumption per horse power. The United States Interstate Commerce Commission which recently enquired into the affairs of an American Railway (8) stated in its report that modern locomotives in the United States are probably 30 per cent. more efficient than those in use in 1915. Possibly the savings would not be as great under the much smaller conditions in Tasmania, but whatever saving might have been possible has been lost. In regard to out-of-date coaches, savings in expenditure might not have been so great but more comfort might have meant less competition, and therefore higher earnings.

32. In order to remedy this state of affairs the accounts for 1926/27 show a new item of expenditure, namely a contribution to the replacement and depreciation fund amounting to £52,500. It is hoped by the aid of this fund to write off some of the old rolling stock and to provide new at a much faster rate than is at present being done. But it is questionable whether this item of expenditure will be continued for long, although it has been decided to provide another £53,000 for 1927/28. Hitherto the railways have always contrived to make some return on capital invested, however small, but this extra load has turned the small profit into a loss on working. Political capital has already been made of this loss with a total disregard for the underlying facts. Its continuance will probably depend on the future earnings of

the railways. The psychological effect of turning the smallest profit into a small loss is usually greater than that of a comparatively large drop in profits providing some profit still remains.

(e) Maintenance as a Whole.

33. Expenditure on maintenance of way and maintenance of rolling stock have this in common that they will be varied as far as possible with income on a non-paying railway. If the two are taken together, they will show an even closer correspondence with gross revenue than either type of expenditure by itself, possibly because retrenchments are at times made in one in order to expend more on the other. The following two tables show gross revenue and expenditure under these two heads by the Tasmanian and Victorian railways respectively:-

(Next Page)

TABLE 1.

Maintenance Expenditure on Tasmanian Government Railways
Compared to Gross Revenue. 1914-1927.

Year ended June 30th	Gross Revenue £	Maintenance		Index Numbers	
		Permanent Way & Wks £	Rolling Stock £	Gross Revenue	Maintenance
1914	330,168	57,685	39,694	948	890
1915	323,265	58,253	40,210	929	900
1916	348,028	66,618	43,429	1,000	1,000
1917	340,505	82,571	43,306	978	1,119
1918	356,735	72,515	48,167	1,025	1,030
1919	401,364	87,902	59,249	1,153	1,266
1920	506,177	100,276	81,096	1,454	1,485
1921	600,045	122,349	80,225	1,724	1,732
1922	588,066	152,186	80,991	1,690	2,075
1923	572,417	144,937	80,618	1,645	2,016
1924	585,468	151,186	86,888	1,682	2,136
1925	548,256	144,613	78,311	1,575	1,987
1926	545,191	134,835	70,666	1,567	1,825
1927	539,352	134,291	71,744	1,550	1,834

TABLE 11.

Maintenance Expenditure on the Victorian Railways Compared
to Gross Revenue. 1911-1927.

Year ended June 30th	Gross Revenue £000	Maintenance.		Index Numbers.	
		Permanent Way & Wks. £000	Rolling Stock £000	Gross Revenue	Maintenance
1911	4,896	804	507	880	835
1912	5,219	893	547	940	918
1913	5,205	930	551	936	943
1914	5,516	936	633	1,000	1,000
1915	5,161	1,107	710	928	1,158
1916	5,705	999	672	1,025	1,065
1917	5,953	927	670	1,070	1,018
1918	5,562	1,040	715	1,180	1,124
1919	6,432	870	696	1,157	998
1920	8,225	1,262	977	1,478	1,427
1921	9,796	1,577	1,255	1,762	1,805
1922	10,791	1,709	1,368	1,940	1,961
1923	11,347	1,762	1,468	2,039	2,059
1924	11,959	1,862	1,581	2,150	2,195
1925	12,759	1,964	1,731	2,294	2,355
1926	12,671	1,929	1,771	2,278	2,358
1927	13,652	2,277	1,832	2,455	2,619

In each case the gross revenue and total maintenance expenditure have been converted into index numbers, 1916 being taken as base (1000) in the case of Tasmania and 1914 in the case of Victoria. Again it must be emphasised that the base years have no significance. They were merely chosen so as to bring the two curves together as closely as possible.

34. The position is seen more clearly in Graph C. In the case of Victoria it will be seen that the two lines run very closely together. There are two disturbances at the beginning and end of the War. In 1914 revenue fell off, while maintenance expenditure had to be carried on according to estimate, while in the later years of the War expenditure was kept down, although revenue started to rise. Otherwise expenditure does not vary much from a little over 28 per cent. of gross revenue. There is, however, a slight tendency towards increase, particularly in the last few years, due probably to the provision of better and faster services, which could not be undertaken without a better standard of maintenance. Putting the low ebb of 1919 (24.4 per cent.) out of consideration, the expenditure rises gradually from 27 per cent. of gross revenue in 1920 to 30 per cent. in 1927.

35. The position in Tasmania is somewhat different. The graph shows the two curves running closely together until 1921, while for the remaining years they are wider apart, although there is very close correspondence in their movements. As shown in Graph A. which includes maintenance of way expenditure only, the correspondence goes back right to the earliest obtainable figures (1891), but there are changes in the distance between the curves corresponding to changes in management. The changes have constantly been in the direction of a higher standard of maintenance. But in this instance there is a more definite reason for the upward swing of maintenance expenditure. In 1922 a substantial increase in wages had to be paid, and in the following year it was decided to write off over ten years £80,000 of expenditure deferred by means of a renewals suspense account. The last item in the abstract of maintenance of way and works expenditure

on Page 41 above is the result of this decision.

(f) Haulage and Traffic Expenditure.

36. Little need be said of the remaining large items of expenditure; namely, expenses connected with locomotive power and traffic. The figures will not be set out in detail as for the other items of expenditure, as they are dominated by two large items. Locomotive expenditure on the Tasmanian State Railways was in 1927 nearly £149,000, and of this coal accounted for £63,900, or 42.8 per cent., and salaries and wages for about £72,000, or 48.3 per cent. The latter figure may be subject to some correction, as the items are not quite clear in one or two cases, but the figure is substantially correct. The whole item was 27 per cent. of working expenditure. The year was normal in most respects, except that the percentage of working expenses was lower than in other years, on account of the new item of depreciation. Leaving this out the percentage comes close to 29, which is about the average.

37. This item might be expected to vary very substantially with traffic, but this is not so. Ripley estimates that only half will vary directly in proportion to traffic and that the other half is *constant*. For the sake of convenience Ripley's terminology has been used throughout this section, although it is slightly misleading, as *constant* expenditure cannot remain half of a variable whole, but this point will be left for later treatment. The *constant* part of this particular expenditure arises in several ways. A locomotive, for instance, will burn fully one-third of its coal to move its own weight, and this has to be burned whether trains are fully loaded or not. In addition, five to ten per cent. of its daily consumption is used merely for firing up to steaming point. A further amount, difficult to

estimate, goes to waste in keeping up steam pressure while a train is at a station.

38. The case of wages is not very different. No more labour is needed for hauling a fully loaded train than an empty one. This is so generally recognised that train loads are becoming larger year by year, where the traffic makes this possible. Where it does not, as in Tasmania, the wages bill becomes relatively high, unless the frequency of trains is seriously reduced. This, however, would lead to the loss of traffic, as faster competitive services would step in where possible. Hence the railways are compelled to run lightly loaded trains, although they are highly uneconomical. It is a matter of productive capacity running to waste; to use an American term, the railways are committing the sin of having "idle overhead". But the sin is not generally chargeable to railway administrations, unless they grossly mismanage their lines; they are more generally due to railway builders.

39. Under the heading of Transportation and Traffic, there was in 1927 spent £119,000, which is 21.59 per cent. of total working expenses. The average for the last ten years (see Appendix 1.) is 22.97 per cent. Of this £96,000, or 80.7 per cent. is spent on wages, the next largest single item being £4,300 for printing and advertising. Analysing the expenditure from another point of view, it is found that £80,100 is spent on station-yard and signal services, and £29,000 on the actual running of the trains, the rest being overhead expenses, which are wholly "constant". Apart from these overhead expenses, about 73 per cent. is station expenses and 27 per cent. is connected with train running.

40. This division is of some importance. It is fairly clear that the expenditure making up 73 per cent. of

this item has very little relation to the number of train-miles run. Station staffs have to be kept about the same within a fairly wide range of traffic, although it will vary with traffic to some small extent. With smaller traffic staffs may be cut down at certain points, and perhaps dispensed with at places which at all times hover between a station and a siding in importance, but such changes are not made rapidly, and are not made for anything but comparatively large changes in traffic. On the other hand, expenses connected with actual train running should vary much more closely with train mileage. Here again there will be friction preventing absolute correspondence on account of the large item of wages. During slack times men are paid although not working as hard or as close to maximum hours as in busy times. Men may be put off, but it is not always easy to increase and decrease a skilled working force at will, for reasons which need not be gone into here.

41. This applies with equal force to the expenditure on locomotive power previously considered. It becomes important in regard to all railway expenditure, on account of the large part which wages play in the total (see Appendix XI). It is, however, not as important in relation to the maintenance of way expenditure as to other items, as this work is carried on largely with unskilled labour, which is engaged and discharged more easily as the volume of work dictates.

42. But this is not the whole story. So far only the relation between expenditure and train mileage has been discussed, but train mileage is not necessarily an index to the volume of goods and passengers carried. A train may consist of anything from a single carriage to the maximum number that the locomotive employed can haul. Even if a

passenger train consists of a number of carriages, it need not necessarily have a full complement of passengers aboard. The same applies to a goods train; although the bulk of the trucks hauled will usually be fully or nearly fully loaded, the total load hauled by an engine may vary considerably.

43. On account of the fact that railways carry traffic of such a great variety, it is difficult to get an accurate measure of its extent. The Tasmanian railways, for instance, will carry a ton of firewood one mile for 2s. 1d., but would charge 10s. 5d. to carry a ton of machinery the same distance. This gives a range of 5 to 1, but if we consider the distance the goods are carried the range becomes many times as great. A ton of chemical manures, for instance, would be carried 365 miles for 15s. 10d., a charge of a fraction more than a halfpenny per mile. Between the rates for a ton of machinery carried one mile and a ton of manures carried 365 miles there is therefore a range in freight rates of 250 to 1. Furthermore, the railways carry passengers as well as freight, and these are carried in different classes and at different rates. Some are season ticket holders travelling at very cheap rates, and others get reduced rates on account of road or steamer competition on the line on which they wish to travel. Hence, while "ton-miles" and "passenger-miles" may be a more accurate measure than "train-miles", they are by no means very satisfactory measures of traffic.

(g) Summary.

44. No very adequate summary is possible at this stage, but it may nevertheless be useful to summarise the conclusions so far arrived at in regard to railway expenditure:-

1. Railway expenditure does not vary in proportion to traffic, because a large proportion of it has to be undertaken quite independently of traffic. It may therefore be divided into "constant" and "variable" expenditure. One obvious form of "constant" expenditure is interest on capital, but nearly all forms of railway expenditure carry some proportion of "constant" costs.
2. The best known formula for dividing railway expenditure into these two classes is that of Ripley which states that "more than one-half of the actual operating expenses (excluding interest on capital) are independent of the volume of traffic".
3. Maintenance of way and works expenditure has a large proportion of "constant" cost, generally estimated at two-thirds of the whole. The cause of this is that the need for repair is very largely due to the ravages of wind and weather rather than to wear by traffic. Expenditure on the maintenance of rolling stock has a smaller proportion of "constant" cost, estimated at about one-half of the total.
4. These two items should therefore be fairly inelastic, but they are in practice two of the most elastic items. The reason for this is that the conception of what is a fair standard of maintenance is a fairly elastic one, and maintenance work will be kept at a minimum on non-paying railways. On the other hand, highly profitable railways will charge to maintenance expenditure ^{on the} actual improvement of capital assets.
5. Expenditure on locomotive power and traffic have also a large "constant" element, due generally speaking to the fact that a certain labour force has to be employed to some extent regardless of the density of traffic.
6. The expenses of administration have not been dealt with in the text, but this is generally assumed to be wholly constant. Whatever variable factor there is in this expenditure is certainly very small.
7. The general conclusion must be that railway transport is an industry subject in a very high degree to the law of increasing returns. Further evidence of this will be submitted in the sections following.

V. SOME FURTHER CONSIDERATIONS OF EXPENDITURE.

(a) Revenue and Capital.

1. The difficulties outlined show sufficiently clearly that it is difficult, if not impossible, to relate the cost of a particular service to the charge made for it. A great deal of the expenditure has to be undertaken whether traffic warrants it or not, some will vary to some extent with traffic, and some is found to be charged partly to revenue and partly to capital. There is no strict line to be drawn between revenue and capital; the matter is one of constant dispute in all industrial undertakings.

2. The problem has already been outlined in dealing with the various items of expenditure, particularly those of maintenance of permanent way and maintenance of rolling stock, but a summary of the general question of provision for depreciation and renewals is necessary. It has been shown that English railways under the heading of maintenance provides not only for renewals of worn out stock, but also for considerable improvements, which might reasonably be called additions to capital. Ripley (1) shows this also to be true of railways in the United States. He points out that maintenance of equipment, which he has previously analysed as one half "constant" and independent of traffic, actually in the years 1900-1906 outran the expansion of business. The same was the case with the outlay on maintenance of way, which should have a larger percentage of "constant" expenditure. Both of these rose higher than the cost of conducting transportation, which he holds to be largely "variable". This is, he says, due to the fact that -

"These figures are confused by the failure to differentiate in the accounts mere maintenance from actual improvements and additions to plant. Expenditure for these latter purposes, charged to operating expenses rather than to capital account, have been so enormous during these years of prosperity that they "confused the true facts absolutely".

The Knickerbocker crisis of 1907 put an end to it, and since then the basis of statistics has been altered. A curve published by Ripley (2) shows very clearly depressions in maintenance expenditure in the lean years of 1904 and 1907.

3. This has been mentioned as peculiar to expenditure on the maintenance of rolling stock, but it does occur in maintenance of way and works expenditure as well. Roads are constantly being regraded in order to cut down running expenses, and prosperous railways will do this type of work out of revenue, while non-paying railways are obliged to charge it to capital, or not do it at all.

(b) A Tasmanian Example.

4. There are some excellent examples of what happens at times in this direction in disputes between the old Tasmanian Main Line Company and the Government of Tasmania. The line was built by the Company under a guarantee of certain profits, and as the line never paid up to the time it was taken over by the Government in 1890, the Government had to pay a yearly subsidy. Difficulty was constantly being met with in the classification of expenditure into maintenance expenditure and capital expenditure, and there was a great deal of correspondence on the point, from 1883 onwards, growing more acrimonious as the years went by, and actually culminating in the shareholders of the Company at a meeting in London, asking the Stock Exchange to boycott a Tasmanian Government loan. (3) This, which took place in late 1888, of course did not improve tempers, and from then on matters grew worse until the Government finally decided to purchase the railway. Some of the expenditure became subject to a claim before the Supreme Court of Tasmania, and the Company was awarded practically the whole of its claim, amounting to £13,225. The report of the

case (4) shows that the claim was granted on an interpretation of the Act covering the agreement between the Government and the Company, and not on the merits of the individual items, but the jury was asked to say what part of the expenditure in dispute could be charged to maintenance and one or two of their decisions are illuminating.

5. The three main items in dispute were:-

1. Some improvements to the Hobart station, including a new porch, some new workshops, and a stationary engine, amounting in all to a little over £11,000. The new engine was claimed as a replacement, the workshops as necessary to cope with new traffic, and the porch as necessary for the public safety.
2. The building of cottages for employees at several stations along the line. In correspondence these were claimed as replacements, to which the Attorney-General objected, because the old huts were erected by workmen themselves, and not worth more than £10 each, whereas the new cottages cost £100 each. (5) In his evidence, before the Court, (6) the General Manager put forward another reason, namely, that the Company was forced to erect these cottages, as their maintenance men were leaving them for construction work in other parts of the State, partly on the grounds that accommodation was wanting.
3. New rolling stock, including engines, carriages and trucks, to the value of £11,800. The Company made no secret of the fact that part of this stock was to replace lighter stock, unsuitable for their faster services, and partly to accommodate increasing traffic.

There were also some small items concerning improvements to the permanent way, and an item of £472 for remuneration of trustees.

6. Here was a dispute illustrating excellently the point made. The Company claimed that these items were covered in the agreement under which the Company undertook to "maintain the line in proper working order", and they were therefore working expenses. The Government claimed that they constituted capital expenditure, and that their inclusion in working expenses was merely a device to exact a larger subsidy from the Government.

7. The jury gave a verdict for the Company for the

whole amount, except the item of remuneration to trustees, which was too clearly a luxury with which the Government could not legitimately be charged. As this decision hinged on a doubtful clause in the agreement, it does not concern this discussion. But on the question of which items could be legitimately charged to "maintenance and working expenses", the jury came to some extraordinary conclusions. In Item 2 above and part of Item 1 (the Hobart station porch and a store building) they would not allow as working expenses, but the rest of the Hobart extensions and the new rolling stock they contended should be so charged. They gave no reason for this extraordinary decision, which seemed to go directly against the evidence of railway accountants and engineers, some of whom were brought from the Mainland to give evidence as experts. The only witnesses who supported their conclusions on Item 3 were the officers of the Main Line Company.

8. The Chief Justice during the hearing of a subsequent application for a new trial admitted that the decision on the matter of new rolling stock was against the weight of evidence, and that the division of expenditure as outlined was so inconsistent that it was impossible to see how intelligent men could arrive at it. The new trial was not granted, but again the chief considerations were points with which this discussion is not concerned.

9. It seems clear that private railways will for a variety of reasons endeavour to better their capital assets in providing for expansion and more-up-to-date methods of working out of revenue, and will, if possible disguise the improvements under the head of "maintenance". State railways, if they are prosperous enough, will try to do the same, but will usually do it in a more open manner.

(c) Doubtful Expenditure.

10. It will be best first to analyse some of this expenditure, before arriving at any conclusions as to what part of it ought to be borne by railway users. We may divide it into four classes:-

1. Actual repairs to permanent way, works and rolling stock. This is clearly an operating cost, over which there can be no dispute.
2. The replacement of plant that has been worn out in service. This is equally clearly a "maintenance" charge.
3. The replacement of plant obsolete or obsolescent, but not worn out.
4. "Betterments" to provide facilities for increased traffic.

It is these two latter classes of expenditure that are always in dispute, and probably always will be. There is no strict line of ~~demarcation~~; there are always cases that appear to be on the borderline. Both classes are chiefly thought of as applying primarily to rolling stock, and particularly engines, which soon become obsolete, but they may equally well contain expenditure on permanent way and works. Indeed, the fourth class chiefly concerns permanent way and works.

11. There are a couple cases in point illustrated by the lawsuit just referred to. The case of the cottages was indeed clear enough to convince an otherwise muddled jury. On the other hand, had the cottages been fairly substantial buildings, in the first place, and the new no more substantial than the old when these were first built, there could have been no doubt that the expenditure was merely replacement. But there could have been an infinite variety of cases between these two. Supposing that more substantial cottages had been built, but that the conception of what a fair standard of accommodation for workmen had

altered in the time between the building of the two sets of cottages, i.e. the standard of housing had risen, what would then be the case? If each, at the time of building provided, for instance a reasonable minimum of comfort, although the second was both better constructed and dearer than the other, would any part of the second cottage be chargeable to capital? The answer would probably be "No". There can be no difference between such a change in standards and a change in the price level, which would most certainly be allowed for. But, if, on the other hand, the first buildings had been proved too unsubstantial to stand the wind and weather in the locality in which they were built, or if the Company proved to its own satisfaction that it would be more economical to build better structures, that is, that they would save in the long run by smaller repair bills, then the case might be different. The expenditure must then be regarded as more in the nature of a new investment calculated to yield profit, than a mere renewal.

12. It is therefore necessary to get behind the accountant's figures, before it is possible in such cases to distinguish capital from maintenance expenditure. To the economist the motive is of much more importance than it is to the accountant; the motive does in such cases as the two last quoted make the difference between the two types of expenditure.

13. Another interesting item in the lawsuit referred to was that of the shifting and extension of a siding at Rhyndaston, an insignificant little station. The siding had been a "blind" one, and some accidents had occurred by trains going over the end. When the siding was shifted in 1884, it was decided for this reason to extend it a little and make it a "loop" siding. Insignificant as the item was, it is a

good example of what might be called a "betterment", that is, an extension to provide increased traffic facilities. One would in this case, come to the conclusion that any expenditure above the cost of the original siding could have been charged to capital, and certainly should have been so charged when it became a matter of adjusting the Government subsidy. In the same class is the equally insignificant, but much debated, item of the new porch for the Hobart station. The Company argued that it was necessary "to maintain line in safe and proper working order". Reckless cabdrivers, it was alleged, persisted in cutting down unsuspecting pedestrians as they emerged from the station door-way, and it was necessary to put such a barrier between the entrance and the road. Here again is a matter of capital expenditure, which was not considered necessary at the time of the construction of the line, but which experience later proved to be a necessity.

14. These are cases in which the extent of a Government subsidy towards profits are involved. With English and American railways the motives for providing capital expenditure out of profits have been of a different nature. In their cases it has been a matter in some cases of cutting down profits. The motive for this is clear where the profits of railways are controlled, as they now are in most cases; but there is an almost equally strong motive where profits are uncontrolled. Railways are public utilities, and the public looks askance at excessive profits in such undertakings. Large profits have, in fact led to measures of control. Rather than risking disfavour and agitations for reduced rates by enormous profits, and realising the probable need for extension, companies have therefore in some instances put large sums into renewals of sound but obsolescent stock, and extensions of plant to provide for

future extensions in traffic, rather than to distribute these as profits. Less prosperous companies would probably not do this work at all, or would in cases of necessity raise additional capital to cover it.

(d) The Practice on State Railways.

15. State railways have not the same incentive to hiding expenditure on "betterments" and extensions, although in one case at least, that of the South African Government Railways, a certain amount of such works appear to be done under the heading of "maintenance".

Most of the Australian State Railways find it sufficiently difficult to make ends meet without doing anything in the way of capital expenditure out of revenue. Dr. Earle Page, the Federal Treasurer, in order to prove Tasmanian extravagance recently said that Tasmania was the only State whose railways provided for depreciation. (7) This was of course an exaggeration, in so far as Western Australia and Victoria both do so, although the latter State has never been able to provide sufficient. It appears that South Australia also provided for depreciation until 1920, but since then there has been an accumulation of deferred payments amounting to over £3.5 mill. But it is true that no State, except perhaps Western Australia, has provided sufficient toward depreciation and renewals.

16. For an example of a prosperous State railway system it is perhaps best to go outside Australia. The railways of the Union of South Africa provide an excellent example of how surplus revenue is disbursed to reduce the capital account. In the year 1924/25 only a little over 70 per cent. of revenue was required to pay working expenses and another 7 per cent. went to a depreciation fund (providing $1\frac{1}{2}$ per cent. on capital). A further 20 per cent. of earnings

went to pay interest on capital. Of the rest £250,000 went to a fund to reduce interest-bearing capital (i.e. a sinking fund to repay capital, providing about 0.2 per cent.) and a similar amount to a betterment fund. As a result of the expenditure under these heads, the railways had by 1925 non-interest-bearing capital amounting to over £8 mill.

17. This is a substantial capital expenditure out of revenue, but it does not tell the whole story. The Auditor-General of the Union in his report of 1924/25 (8) points out that a substantial amount of new work is provided for out of the Renewals Fund. The statement shows that in the years 1912/13 to 1924/25:-

New Rolling Stock built amounted to ...	£14,025,369
The value of Rolling Stock actually withdrawn from service amounted to ...	1,508,281

Leaving ... £12,517,088.

expenditure on expansion of rolling stock, which a less prosperous system would have charged to capital account. It is difficult to see from the figures and description of items whether similar new work is being done on the permanent way and works, but it is unlikely that all the expansion should take place in one department. The Auditor-General contents himself with a mild protest.

18. While there is nothing actually unsound in such proceedings, it should be pointed out that it does place an undue burden on railway users, if the policy is carried too far. It means an extra burden on producers; if they can bear it without difficulty, the policy cannot be criticised; if it places them in difficulties, a surplus is better utilised in the reduction of freights. But in any case, such expenditure should be debited to capital to show the true position. Taking the expenditure on rolling stock

for 12 years alone, the item "non-interest-bearing capital" ought to be at least £21 mill. instead of the £8 mill. shown in the balance sheet.

19. The only State in Australia whose railways come near enough to paying to improve the capital position out of earnings is Western Australia, and in the case of this State it is not difficult to sum up the position from published figures. There is no depreciation fund or renewals fund, but ample renewals seem to be provided for out of suspense accounts, which are recouped out of revenue. (9) But care is evidently taken not to include anything in the nature of capital expenditure. In the relaying of lines previously laid with 45 lbs. rails by substituting 60 lbs. rails, for instance, the margin of cost between the lighter and heavier type of rail is debited to capital. This is not the case on the South African Railways, where one often comes across items for "strengthening" or "bringing up to standard" sections of line out of revenue under the head of "renewals". (10) Most probably this is expenditure on relaying with heavier rails or similar expenditure, which ought to be charged to capital, whether provided from revenue or not.

20. But although the Western Australian railways do not indulge in this more or less irregular procedure, they have provided capital expenditure from revenue. Taking the 1926/27 report, the position appears to be as follows:-

Shown in balance sheet as contribution	
from revenue for capital purposes ...	£643,157

But from this must be deducted an accumulated deficit, shown in a separate statement, and evidently made good from consolidated revenue (i.e. not paid by railway users)	230,784
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Leaving a net contribution to capital from	
Railway revenue of ...	£412,373

In addition to this Western Australia provides annually a contribution towards a sinking fund on her debt, of which during the last five years £126,000 annually has been altogether allocated to railway capital. As the railways during the last few years have shown a small profit, it would at first sight appear that this has gone towards the provision of sinking fund, but as it has gone towards reducing the deficit shown above, railway users cannot be said to have contributed anything towards the sinking fund.

(e) Summary.

21. Summing up the position arising out of the above discussion, the following points seem to emerge:-

1. Railways that show a profit are apt to provide capital expenditure out of revenue. In the case of private railways this is usually done under the cloak of maintenance and renewals of worn out assets, so that the true position is disguised.
2. Government railways on a payable basis will provide revenue for capital purposes. Sometimes, as in the case of the South African railways, this will be done partly under the heading of renewals, but as their accounts are open to the public, it is much easier to ascertain the fact of its being done, although the true position is not ascertainable.
3. In Australia the only State whose railways are prosperous enough to indulge in this practice is Western Australia, and in her case the whole of such expenditure is definitely shown as non-interest-bearing capital.
4. In other Australian States the railways cannot even provide for depreciation and renewals. The combined deficits of the railways of the five States in 1926/27 was more than £4 mill. For New South Wales and Queensland, no figures are available, but the South Australian railways show an accumulation of deferred depreciation amounting to £3.5 mill., and the Victorian Railways' Commissioners estimate their capital account to include £16 mill., for which there are no corresponding assets.
5. The Tasmanian railways are in a still worse position, having provided nothing for depreciation until 1926/27, when the £52,500 written off was more than revenue could stand. The capital must therefore be regarded as badly inflated.

6. From one point of view, therefore, railway users in Tasmania have been subsidised by taxation, not only to the extent of the £5 mill. accumulated deficit on working, but in addition with an amount that should have been provided annually for renewals, or alternately, written off as depreciation.
7. The whole discussion illustrates the difficulty of drawing a sharp line between capital and income. In the case of renewals for instance, there is in most cases a wide margin for difference of opinion as to what should be charged to revenue and what to capital, even in the minds of engineers in charge of the work. In a prosperous concern, the inclination will be to charge to revenue as much as possible; in a struggling undertaking nothing will be taken out of revenue that can possibly be charged to capital. This does not apply only to railways; it will be equally applicable to all industrial undertakings, and certainly to all publicly owned enterprises. In regard to non-paying private enterprise, there may be a small proviso. It may be objected that it is difficult for a non-paying enterprise to extend capital, and this is certainly true of enterprises with fully paid-up capital. But there is still a considerable margin in the provision for depreciation and renewals.
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VI. EXAMINATION OF RIPLEY'S FORMULA.

(a) Is Railway Expenditure Elastic?

1. Railway expenditure is, as has been seen, fairly elastic, but despite this railway transport is an industry with rapidly increasing returns. These two opposites seem difficult to reconcile, but a moment's reflection will show that they can be brought into harmony.
2. Railway expenditure is elastic only because it is easy for a number of years to trench on capital by postponing expenditure on the maintenance and renewals of capital assets. It is perhaps not elasticity in the usually accepted sense of the word, but it becomes extremely important to railways finding it difficult to pay their way. For this reason, probably, it has been lost sight of by most writers on railway economics, who deal chiefly with more prosperous railway systems than those of Australia.
3. Eliminating this elasticity in times of need, railway expenditure does not vary very closely with traffic, because of the large amount of so called "constant" cost. But in eliminating "elasticity in times of need", we must remember that we eliminate consideration of all railways except those which just pay, because the "need" is not necessarily a lack of funds; it may be an embarrassment of riches. To this it may be objected that it is only a trick of the accountant which transforms "constant" costs into "variables" on prosperous roads. This is true, but the facts are that capital expenditure and maintenance expenditure are difficult to disentangle if the accountant chooses to mix them, and one can only voice suspicions when he appears to overdo it.
4. But one can eliminate considerations of this by assuming that railway accounts are kept in strict

accordance with facts, i.e., that sufficient is charged to revenue to cover the maintenance of assets in proper order, and no more. Railway expenditure then becomes highly inelastic, and a railway system an undertaking of increasing returns, because of the large proportion of expenditure which has to be undertaken irrespective of traffic, and which therefore must be regarded as in the nature of overhead costs. Ripley's statement that about half the operating expenses of a railway system is "constant", probably applies to railways that just pay a normal return on capital, and his implication that they will remain half of the variable whole is probably a result the practice of doing insufficient maintenance on poor roads, and of charging capital expenditure to maintenance on prosperous roads. It is quite true that with expansion there is more property to maintain, but that does not account for the whole of the extra expenditure. Could anyone ever have conceived of it as "constant" if it did? In any case, an analysis of the expenditure in itself shows that it cannot possibly vary with traffic.

(b) Ripley's Method of Division.

5. But facts seem to point to Ripley's formula holding good in the case of railways paying a normal return after having provided for proper maintenance and no more, and its importance must not be underrated. It is therefore of interest to see how Ripley set out his conclusions. He does so in the following table, which deals with the experience of American roads:-

Expenditure	Per cent. of operating expenses.			Per cent. of Total expenses.		
	Both	Con- stant	Vari- able.	Both	Con- stant	Vari- able.
Maintenance of Way ...	20	13.4	5.6	15	10	5
Maintenance of Equipment	20	10	10.0	15	7.5	7.5
Traffic Expenses ...	56	28	28	40	20	20
General Expenses ...	4	4	-	3	3	--
Total Operating Expenses	100	55.4	44.6			
Fixed Charges, (Interest etc.)				27	27	--
Total Expenditure	100	67.5	32.5			

It should be explained that all of this is an estimate arrived at after a long theoretical discussion, (1) but it seems to agree with generally accepted opinion, and is probably substantially correct. But complete accuracy is impossible to get. Charges are far too much dependent on a variety of causes to allow of complete separation. One knows, for instance, that the large sums spent on destroying weeds on the permanent way are in no way affected by traffic, although revenue will determine how much the enterprise can afford to spend on such work. But the relaying of rails and sleepers present cases not so simple; part of the expenditure is due to traffic and part to weather, but it is impossible to say how much of it is due to each. And most heads of expenditure depend on the same considerations.

6. Ripley quotes the Vice-President of the Southern Pacific Railroad, and the German authority Sax as supporting his estimate, and Sir William Acworth, (2) writing later than Ripley, comes to exactly the same conclusion. Incidentally Acworth falls into the same trap as Ripley, practically quoting his formula, and stating this to be "a common and on the whole probably roughly accurate estimate". But he attempts no analysis of his own, and does not make it quite clear whether he means to include return on capital in the "constant" half or not, unfortunately a very common fault with Acworth. Jones also merely accepts Ripley's figures, leading up to them by the same arguments. (3)

7. It will be seen from the table above that Ripley makes it quite clear that it is half of operating expenses, which he considers "constant". If return on capital and other fixed charges, such as taxes, are taken into consideration, the proportion of "constant" costs rises to 67.5%; just over two-thirds of the whole.

(c) Australian Figures.

8. Australian figures show substantially the same result, if divided into constant and variable on Ripley's formula. The figures given in the table below are for the year 1926/27. In Tasmania's case, the item for depreciation has been omitted as it does not occur in other years. The others have been adjusted as far as possible to come under the four heads used by Ripley:-

Percentage of Operating Expenses.

Expenditure	Tasmania			All States. (4)		
	Both	Con- stant	Vari- able.	Both	Con- stant	Vari- able.
Maintenance of Way.	27.7	18.5	9.2	23.2	15.5	7.7
Maintenance of Equipment ...	15	7.5	7.5	18.4	9.2	9.2
Traffic Expenses..	52.6	26.3	26.3	54.4	27.2	27.2
General Expenses..	4.7	4.7	--	4	4	--
	100.	57.	43.	100.	55.9	44.1

9. The proportions of constant and variable costs come very close to Ripley's figures when all States are taken together; there is only one-half per cent. difference. In the case of Tasmania, the proportion of constant costs is slightly higher, due mainly to the higher proportion of maintenance of way and general expenditure. This is to be expected, considering the light traffic on the Tasmanian lines. It is questionable whether the proportion of constant cost is not even higher. Tasmania has a lower proportion of expenditure on the maintenance of rolling stock, which is possibly due to lighter traffic, hence the proportion of constant cost in this item may be more than one-half. While Ripley's mode of division has been followed, one may be nearer the truth by allowing 9 per cent. as constant, and only 6 per cent. as variable, thereby bringing the

proportion of constant cost in this item nearer to the proportion in the other States. It is quite obvious, that if the rolling stock and other equipment was kept in perfect order this would be the case, but even with the imperfect maintenance dictated by lack of funds there is probably a higher proportion of constant cost. The high figure for maintenance of way, of which a larger proportion is regarded as constant, suggests this.

10. In regard to traffic expenditure we may come to the same conclusion. A great deal of the expenditure, as has been previously shown, has to be undertaken in any case. This applies both to labour employed and to coal used. It is therefore likely that also this item has, as far as Tasmania is concerned, a higher proportion of constant cost than that allocated, namely, one-half.

11. When interest charges, which are fixed, are brought into the table, the proportion of constant cost in the highly unremunerative Tasmanian railways stands out in still greater relief from the rest. These are given in the following table:-

Expenditure	Percentage of Total Expenditure.					
	Tasmania			All States.		
	Both	Con- stant	Vari- able.	Both	Con- stant	Vari- able.
Maintenance of Way.	17.6	11.8	5.8	17.3	11.5	5.8
Maintenance of Equipment	9.5	4.8	4.7	13.	6.5	6.5
General Expenses	3.	3.	--	3.	3.	--
Traffic Expenses	33.5	16.8	16.7	39.5	19.8	19.7
Fixed Charges	36.4	36.4	--	27.2	27.2	--
	100.	72.8	27.2	100.	68.	32.

12. Again the average of all States is close enough to the American average given by Ripley, but the Tasmanian figures show a great difference, although they are still divided on the formula given by Ripley. If instead the

constant costs under the heads of maintenance of equipment and traffic expenditure were given greater weight, over three-quarters of Tasmanian railway expenditure would be constant. And there is the additional factor that maintenance of way would show a higher figure, if the road was kept in the state of repair that higher earnings would allow.

13. While the figures apply only to one railway system, there is no reason to suppose that other railway systems in similar conditions would not show the same result. There is, in fact, ample confirmation in the statistics of the Commonwealth Railways, which are substantially in the same position, that is, they struggle to pay working expenses, and contribute little or nothing towards return on capital. As the distribution of expenditure has varied somewhat during the past few years, two years that together will give a fair average have been taken. The new result does not differ much in the two years, as low maintenance of way expenditure in the second year is made up by interest taking a larger proportion of the whole. Reading between lines in the report, it appears that maintenance expenditure was kept low in a desperate effort to pay working expenses out of revenue; there had been a shortage of £109,000 the previous year.

COMMONWEALTH RAILWAYS.

Expenditure	Percentage of Total Expenditure.					
	1925/26			1926/27		
	Both	Con- stant	Vari- able.	Both	Con- stant	Vari- able.
Maintenance of Way.	24.5	18.3	6.2	18.6	12.4	6.2
Maintenance of Equipment ...	9.5	4.7	4.8	9.2	4.6	4.6
Traffic Expenses..	25.5	12.8	12.7	29.7	14.9	14.8
General Expenses..	2.5	2.5	--	2.3	2.3	--
Interest Charges..	38.	38.	--	40.2	40.2	--
	100.	76.3	23.7	100	74.4	25.6

14. The result is substantially the same as that obtained for Tasmania. The proportion of constant cost is slightly higher, showing an average of 75.4 of the total as against Tasmania's 72.8, but it must also be remembered that the Commonwealth Railways are in a slightly worse position financially than the Tasmanian. The latter have contrived to pay some small part of interest charges out of revenue; the former are struggling to pay bare working expenses.

15. It may now be interesting to see the allocation of expenditure in a railway system at the other end of the scale as far as Australia is concerned. The Western Australian railways have been shown elsewhere to pay interest charges, and even to make a small contribution to capital expenditure from revenue. The expenditure of the Western Australian railways for 1926/27 was as follows:-

WESTERN AUSTRALIAN RAILWAYS.

Expenditure	Per cent. of working expenses.			Per cent. of total expenses.		
	Both	Con-stant	Vari-able.	Both	Con-stant	Vari-able.
Maintenance of Way.	23.7	15.8	7.9	17.7	11.8	5.9
Maintenance of Equipment ...	17.5	8.7	8.8	13.8	6.9	6.9
Traffic Expenses..	56.	28.	28.	41.8	20.9	20.9
General Expenses..	2.8	2.8	--	2.1	2.1	--
	100.	55.3	44.7			
Interest Charges.				24.6	24.6	--
				100.	66.3	33.7

16. The difference is interesting. Here the proportion of constant cost to total is lower than in any of the other examples, and even comes below the American

average. It is, in fact, almost exactly two-thirds of the whole, as stated in the formula. The "constant" part of railway expenditure appears to be more of a constant than the formula suggests.

(d) The Formula Re-stated.

17. Ripley's formula may now be restated, and some final observations made on it. Ripley's formula, given on Page 55 of his book on Railroad Rates, states:-

"One arrives at the general conclusion that approximately two-thirds of the total expenditure of a railroad and more than one-half of the actual operating expenses are independent of the volume of traffic".

J. M. Clark (5) in attempting to explain the self-contradiction in the formula does not get very much further, although he suggests a way out:-

"What this means is that certain kinds of variations in traffic, limited in amount and duration, do not affect capital investment at all, while their effect on operating expenses is as if half of them varied in proportion to traffic and half remained constant".

There is certainly some truth in this statement, and it may apply to the aggregate of American railways, which will probably, when they are all considered together, pay a fair return on capital. Ripley's formula, even with Clark's refinement, therefore is too broad and can only be applied to equally broad averages.

18. Clark's idea is expressed more clearly by Acworth, who gets it down to a mathematical formula:-

"...if it costs x to deal with 1,000,000 units of traffic, 5,000,000 units will cost, not $5x$, but $\frac{1}{2}x$ plus $(\frac{1}{2}x \times 5) = 3x$ ".

Acworth, unfortunately, does not make it quite clear whether he considers the constant half to include return on capital, but it may be assumed that he is following previous writers, and that his formula is calculated to apply only to working expenses.

19. But the tables given above certainly tend to show that the facts are not the same when the average non-paying railway is considered. It stands to reason that if part of the costs is constant and part variable, the constant part can be half only at a certain point, or at least within a certain range. That it is a range rather than a sharp point cannot be disputed; at certain points expansion must force "constant" costs up by the necessity of providing increased plant and facilities. Ripley and Clark both rely on this for their explanation of the reason why "constant" costs rise with "variable", and the weakness of the formula given by Acworth lies in the fact that it takes no note of this necessity for expansion. It may, for instance, hold good for the range stated, while the handling of another million units, owing to congestion of traffic, might necessitate the duplication of portions of the line, in which case his constant costs might go up to ~~5x~~ or even higher.

20. A great deal will depend on the profits made or the expectation of profits, as expansion will not be undertaken unless a railway management has a reasonable profit in sight. It is not to be expected that profits will be the same immediately after an expansion as before, but they must be capable of rising to the old point or above within a reasonable period.

21. But the analysis of the costs of the Australian railway systems show that while the formula may hold good of railways on the average, it does not hold good in all cases. The examples of the Tasmanian and Commonwealth railways show that constant costs in systems with a small amount of traffic in proportion to capital rises from two-thirds of total expenditure (including interest) to

three-fourths. It may be argued that these cases are exceptional, but it often takes the exceptional to bring out the faults of a theory. The orgy of post-war inflation showed up a great many faults in monetary theory, which seemed microscopic in milder inflations; the grotesque position of these two railway systems may similarly serve to make visible faults in theory which smaller variations from normal would not show up.

(e) Summary.

22. The question of how far Ripley's formula and its variations will apply may now be summarised:-

1. It is probably true on the average of railways which pay a fair return on capital. Analysis of Australian figures show that it substantially holds good for railways which fail to reach this standard of financial result, as these in the year in question were in the aggregate something over £4 mill. short of interest on capital. One may, therefore, assume that it holds good over a small range both above and below what is considered a normal return on capital, or at least that the variations for this range are too small to be noticed.
2. But it must be assumed that above this standard the proportion of constant costs shrinks, and that below it they expand. The Tasmanian railways show constant costs as nearly 73 per cent. of the total, instead of 68 per cent. in the case of the Australian average, and the Commonwealth railways, which are in a worse position financially, show constant costs amounting to over 76 per cent. On the other hand, Western Australian railways, which are in a slightly better position than the average, show constant costs amounting to only a little over 66 per cent. of the total expenditure.
3. There is also a further proviso necessary. If non-paying railways were not hampered by a lack of funds, more would be spent on maintenance, with the result that costs regarded as constant would rise still further. Similarly, in the case of railways earning more than normal return on capital allowance must be made for the fact that they improve assets out of revenue; i.e., their constant costs are likely to be inflated. Were it possible to take this into consideration, the difference in the proportion of constant costs between railways with light traffic and railways with heavy traffic would be greater than that shown.

4. The formula would be more nearly correct if it merely stated that all interest and general charges, two-thirds of maintenance of way expenditure and half of other expenditure could be regarded as constant. This would allow for the proportion of constant expenditure rising and falling inversely with traffic.
5. But it must be kept in mind that the division of expenditure under these heads are only rough estimates, and that even these must vary with conditions. It has been shown in Section IV. for instance, that maintenance of way expenditure independent of traffic is greater on a line with light traffic than on one with heavy traffic, and this also holds good of maintenance of rolling stock. It might also be argued that on the average expenditure on the maintenance of rolling stock includes more than 50 per cent. of constant cost. But traffic expenses may include less than 50 per cent. constant expenditure, and possible errors in the two are therefore likely to balance each other. There may also be some small proportion of variable cost in general expenses, but the proportion would in any case be too small to make any substantial difference.
6. It is at present impossible to get closer to actual facts than the estimates of division of costs given. No railway system has yet thought it worth while investigating this problem. A thorough investigation would certainly involve a great deal of time and expense.

VII. RAILWAY RATES.

(a) The Nature of Overhead Costs.

1. Sufficient has now been said to prove that railways are subject in a very high degree to the law of increasing returns. The law applies to all industries with high overhead costs; that is, costs that have to be undertaken to some degree irrespective of output. Capital outlay is the best example of such costs, and this is exceedingly high in the case of railways.

2. But this is not an adequate definition of overhead costs; as Clark (1) points out "it covers an entire family of ideas". The most real problems involve the fact that an increase or decrease of output does not involve a proportionate increase or decrease in cost. They arise from the fact that a plant will have a certain definite productive capacity, which has to be paid for whether used or not. When this productive capacity is not used to the full, we have what is known in the language of industry as "idle overhead;" that is, overhead costs for which there is no corresponding revenue.

3. But there is also another implication in the term "overhead", which becomes very important in railway management, and particularly in railway rate making. Overhead costs are costs which cannot be allocated to particular units of output, or at least cannot be allocated with the same precision as what might be termed "direct costs"; as, for instance, the price of flour may be allocated to particular loaves of bread. They are joint costs, some part of which must be allocated to each article, without any exact knowledge of the particular portion of these costs attributable to the production of the article concerned. The question is - How do these joint costs affect the prices of individual commodities or services produced?

4. The principle is most easily explained by the familiar case of cotton. At one time the cotton plant was grown solely for its fibre; the seed was worthless. Under these conditions there was only one marketable product, which clearly had to bear all the costs of the industry. Price would be determined by the relation between supply and demand; price would, in the long run, tend to be regulated by the cost of producing the most expensive portion of the supply. Then uses for the seed were found. Seed and fibre are produced at a joint cost, but it is impossible to say how much of this cost is attributable to the seed, and how much to the fibre. In the first place, the fibre would probably sell at the same price, and anything that could be got for the seed, above the cost of handling it, would be profit, but this would naturally attract new growers, lower the price of fibre, and tend to make the return from seed and fibre the same as the previous return from the fibre alone. What will be the apportionment of price between fibre and seed? That will be determined by the relative intensity in the demand for the two products. If the fibre remains in greatest demand, as it has in fact done, it will bear the greater proportion of the joint costs.

5. The principle of joint costs is simple in such a case; it becomes more complicated in industries such as the meat packing industry, which turns out an enormous variety of products, such as meat, hides, margarine, soap, glue and a host of other products. In this case there are joint costs, but in addition costs attributable directly to each individual product. The same principle again applies; the joint costs will be distributed in the prices of the various products, according to intensity of demand, but each product must at least realise something more than its special cost. Take, for instance, the case of fertiliser, which

is generally made from blood, bones and other material once regarded as waste. They may be still thrown away, in which case their disposal will be a cost to be borne by the other products of the plant. There will be new costs in turning them into fertilisers, but if the fertiliser will bring a price which returns something more than this cost less the cost of disposing of the waste material, it will pay the plant to do so. If, for instant, it will pay the whole of the additional cost in its manufacture, it will have relieved the other products of the overhead charge incurred previously in disposing of waste.

6. Yet a different and somewhat interesting case is presented by the new Tasmanian Flax Industry at Launceston. Here, as in the case of cotton, there are two main products, fibre and seed, both of which are normally marketed. But in the case of the Tasmanian industry there is as yet no market for the fibre. The position is that a factory has been erected to separate seed from fibre and to treat the fibre. Ultimately, it is intended to use the fibre in the same factory for the manufacture of canvas. But, as in the case of sugar beet, it is essential for the factory to have an assured supply of the raw material near at hand, and there is as yet not a sufficient supply. Consequently, the fibre has no present value (to the company concerned) and is being stacked for use some time in the future.

7. The seed only is being marketed, some being sold to a firm making linseed oil, and some specially selected seed being re-sold to farmers for sowing. The two kinds of seed alone present a nice problem, which, as will be shown later, often occurs in railway management. The seed sold to farmers will be of a better quality than the other, but there will be no sharp line between the two; one

will shade into the other. And there will also be another difference. The farmer will have to pay higher, because of the better grade, but also because the factory will be able to regulate the supply to him, being assured of a market for the surplus. On the other hand, the factory cannot demand too high a price, as it is eager to extend the area under crop.

8. If these were the only two products, the case would still be comparatively simple. The factory, having the two markets, will be able to regulate the supply to each so as to get the maximum net return. If the total return from the two covered costs, the trade would pay. But the factory will not be able to get an adequate return, because the seed has to compete with other seed produced by factories which make use of the fibre. What cost, then, may be charged to the fibre? This is a far more difficult problem. The present value of the fibre may be calculated at its future value, less interest on the money invested in it and cost of storage, insurance, etc.

9. But there are two uncertain factors. The first concerns the time of waiting for an adequate supply to start processing fibre and manufacturing canvas, or processing fibre for sale to other manufacturers. Each course presents problems of its own, but in neither case is it easy to foretell the time when the fibre will be used. The second concerns future price, which, being dependent on a number of causes outside the control of the manufacturer, cannot be foretold with any degree of certainty. Here again is a problem that often faces the railway manager.

(b) Application to Railways.

10. These problems of joint costs and increasing returns may now be applied to railway policy. The *output* of a

railway consists of a mass of widely differing services. It transports both passengers and goods, and the number of different commodities transported is legion. To quote Ripley:-

"Imagine the Encyclopaedia Britannica, a Chicago mail-order catalogue and a United States protective tariff law blended in a single volume, and you have a freight classification as it exists in the United States at the present time".

11. One must suspect Ripley of a slight exaggeration, although even the Australian freight classifications are fully as complicated as the Australian tariff. One Australian State issues a goods rates book of 320 pages, and the literature of this class issued at brief intervals by all State railways in Australia aggregates nearly 1,500 pages.

12. And not only are there thousands of articles of freight, but some travel short distances and others long distances; some come in sufficient quantities to make up a whole trainload, and some are sent in lots so small that it takes many consignments to make a truckload. Even passengers are carried under widely different conditions. Some travel short distances to and from work every day, some travel longer distances on business or for pleasure occasionally, and some will travel on holiday only when the railway holds out special inducements for them to do so. Again some will be prepared to put up with more discomforts than others, providing the railway makes up for the discomfort by charging them a lower rate.

13. On what principle should a railway charge for all these services? Should it base the price of each service on the cost of performing it? That may be desirable, but it cannot be realised. The services are carried on under joint costs, and it is impossible to disentangle these costs. The expenditures of a railway have already been analysed, and

the analysis shows how difficult it would be. This is seen clearly in the case of a small consignment of goods carried on a "mixed" train, which carries both passengers and goods. The cost of carrying the goods is inevitably linked up with the cost of running the whole train.

14. There should, however, be a standard rate, actual rates being regarded merely as deviations from this standard. But this standard rate is very difficult to define. If goods only were carried, one might find this payable standard rate by per mile by dividing the total expenditure for the year by the number of tons carried one mile. Thus if the total expenditure for the year were £1 mill., and the total of goods carried amounted to 120 mill. ton-miles, the standard rate per ton-mile would be 2d. But the railways carry passengers too, and as these are not measured by the ton, there is no common denominator to which the two classes of traffic can be reduced. It is therefore necessary to determine, more or less arbitrarily, how much can be got from the passenger traffic and how much from the freight traffic. As in the case of commodities produced under joint costs, the revenue to be obtained from each type of traffic must be determined by the relative demand for the two. There are, of course, some costs attributable directly to each type of traffic, such as the provision of different classes of rolling stock, but the majority of costs are incurred jointly by both types of traffic.

15. It is not possible, therefore, to lay down any definite principle on which the costs should be divided between passenger and goods traffic. How they are actually divided in Australia may be seen from the following figures of earnings per passenger mile and per goods ton-mile

in four States during 1926/27:-

State	Earnings per	
	Passenger mile.	Goods ton-mile.
Tasmania	1.06d.	2.23d.
Victoria	0.92d.	1.72d.
New South Wales	0.90d.	1.50d.
South Australia	0.83d.	1.65d.

It will be seen that the earnings per passenger mile is roughly equal to half the earnings per goods ton-mile; in Tasmania they are slightly below half, in Victoria and New South Wales slightly above, and in South Australia almost exactly half. The figures vary slightly in proportion to each other from year to year, and it must be remembered that they are divisions of revenue, and in no case cover all costs, as each State had a deficit. But it appears that on the average the proportion of revenue per passenger mile and per goods ton-mile in Australia is roughly one to two.

16. But having settled that, there are numbers of other considerations to be dealt with. Suburban passengers, for instance, cannot be induced to pay fares as high as country passengers. In Victoria country passengers in 1926/27 paid 1.28d. per mile, while suburban passengers paid only 0.72d. per mile, and in New South Wales country passengers paid the same and suburban passengers only 0.60d. Here again, then, is a difference of two to one in charges, due primarily to conditions of demand. But in this particular case cost of service also plays a part in the difference between the two rates. There is little difference in the cost of running a train, whether it is crowded or empty, and the suburban trains are usually far more crowded than country trains, with the result that the

portion of the cost falling on each passenger is much smaller in the case of suburban trains.

17. To some extent it is possible to say the same of goods. Gravel or road metal, for instance, does not take the same amount of handling as perishable goods. Gravel may travel by slow train in open trucks, while perishables must travel fast and in special vehicles, which in some cases have to be cooled. But much further than this it is not easy to go; the costs of one service are so inextricably mixed up with the costs of another, that they cannot be separated. To get a clearer view of the situation it may be wise to return to the analysis of expenditure in previous sections. It was shown that about two-thirds of the whole expenditure (in Tasmania's case three-fourths) was constant, i.e. had to be undertaken whether there was any traffic or not. It is clear that none of this expenditure can be allotted to any particular service, but one may go even further. Expenditure on the maintenance of the permanent way and works, for instance, cannot possibly be allocated to particular services except on an arbitrary basis. It is impossible to say that a passenger coach causes more or less wear and tear than a goods truck of the same gross weight; one has to assume that the same amount of damage is done. And the passenger coach may be crowded, or it may not contain a single passenger. The same is the case with signal and station staffs; they perform services all day for trains carrying both goods and passengers.

18. Without going into actual figures, which must be arbitrary in any case, it may be safe to say that as much as 85 to 90 per cent. of railway expenditure cannot be charged to any particular service. That adds very little to the 67 per cent. regarded as "constant," which

certainly has no bearing on the direct cost of any particular service. A small consignment of goods packed in a truck with a number of other consignments of different goods will have very few costs directly assignable to it. Goods like coal, carried not only in whole truckloads, but even in trainloads, will have more direct costs. Yet in the case of whole trainloads of one commodity there are difficulties, which are well illustrated by an investigation by the Accountant's Branch of one Australian railway system. (2)

(c) Results of the Investigation.

19. The goods concerned in the investigation, which was a very thorough one and took six months to complete, was of the class that is usually transported in trainload lots, such as coal. For simplicity it will therefore be taken to be coal. At the outset, the accountant points out that the charges which can be directly assigned to any particular service form but a relatively small proportion of the total cost; the larger proportion can be arrived at only by a series of assumptions arbitrarily made.

20. Certain trains were selected as typical of the traffic after consultation with the officers of the Transportation and Traffic branches, and the costs of running these trains were arrived at on the following basis:-

1. Wages of train crews, cost of coal, oil and other supplies. The actual costs of what was regarded as an average trip were ascertained from the Rolling Stock and Transportation branches.
2. Repairs and renewals of rolling stock. The average cost per mile for the previous year for the various units used, namely locomotives, trucks, and vans, were ascertained from the Rolling Stock Branch.
3. Replacements of rolling stock. This was computed on the basis of the annual investment at 5% compound interest on an amount sufficient to extinguish the capital cost over the lives of the different units.

4. Interest on the capital cost of rolling stock. In the case of locomotives and vans the interest was based on the annual interest payable on each of these items of stock, applied on the basis of the actual mileage run in the traffic concerned as compared with the average annual mileage. Interest on the cost of trucks was based on the assumption that on an average, a period of four days would be occupied in placing, loading, running, and discharging each truck. In addition, an allowance of 5½% was made to cover the periods in which the trucks had been under repair.

21. These are all the costs which can with any degree of certainty be ascertained, and even these are not all direct or "prime" costs, as all the items contain an element of what might be termed overhead charges. This is clearly indicated by the fact that the word "average" either occurs or is implied in each item.

22. It might be thought that the first group of items could be easily calculated, but it is not as easy as it might appear. It will be noticed, for instance, that the costs are calculated on "what is regarded as an average trip". In other words, no two trips over the same line and even with approximately the same load are equal. Delay may be occasioned by a variety of causes, and if there is delay there is extra payment of wages, and there will in addition be extra cost of coal, oil and other supplies.

23. Furthermore, there are some wages and coal costs which cannot be attributed to the running of a particular train, unless this is the only train run by an engine for the day. Such an item is that of firing up to steaming point and if the engine makes more than one trip, which it usually will, there has to be an allocation on a mileage basis, more or less arbitrary in nature. A good deal of coal also goes in keeping up steam while the train is waiting on a siding. If such a delay is caused by waiting, say, for a fast passenger train to pass, would it not be reasonable to charge at least part of this cost to the favoured traffic? And if so, what proportion could

reasonably be charged? These are problems one constantly meets with in segregating costs in railway operation.

24. The other items are all computed on averages, and all obviously contain some element of overhead cost, that is, cost that would have to be undertaken whether the particular traffic under review was procured or not.

25. The investigator took a number of typical trains, working out costs on this basis for each of them. He then divided the result in each case by the number of contents ton-miles, and the results showed surprising differences in costs for different trains, some costing more than twice as much per contents ton-mile as others. Some of this would be accounted for by the varying length of haul, and some by other conditions, such as varying grades and varying density of traffic on the different lines. But he worked them out at an average, and found that these costs, applied to the coal traffic, amounted to, say, one penny per ton-mile.

26. But these are only a small portion of the total cost of carriage. The rest, however, consists of charges of a nature that cannot be attributed to any traffic except on a basis of average for all traffic, and this was done. The items included were:-

1. Proportion of station yard and signal service, calculated on a ton-mile basis. These are joint costs which it is impossible to allocate to particular trains except on an average of all traffic.
2. Maintenance of way, works and buildings.
3. Stores Branch expenses, general accountancy work, cost of administration, pensions, gratuities, superannuation and a number of general charges.
4. Interest on capital cost of permanent way, works, buildings, etc.

27. When these were added up and calculated per ton-mile they were shown to be heavier than the charges of the first group by about 40%. For our purposes we will say that they amounted to $1\frac{1}{2}$ d. per ton-mile for all traffic, and that as there are no means of differentiating between coal and other traffic, it was assumed that the proportion of these costs to be allotted to coal was $1\frac{1}{2}$ d. per ton-mile. This made the total cost of carrying coal under the assumptions made $2\frac{1}{2}$ d. per ton-mile. It must be kept in mind that these are not the actual figures arrived at, which were in fact somewhat smaller, but the proportions between the two groups of costs are roughly the same.

28. Were coal the only class of freight handled by the railway, the case would be comparatively simple, although there would still be complications. To recover all its costs the railway would have to charge rates that averaged $2\frac{1}{2}$ d. per ton-mile; to realise a reasonable profit it would have to charge a little more. But railways do in practice not charge a flat rate per ton-mile, their charges vary with distance. It may be convenient at this point to go into this matter.

(d) Rates and Length of Haul.

29. If railways cannot charge a flat rate per ton-mile, in this case $2\frac{1}{2}$ d. per ton-mile, it must charge rates that on an average will bring in the same revenue. That is, for the average length of haul in this case $2\frac{1}{2}$ d. per ton-mile would be charged; for shorter hauls a higher charge must be made in order to allow a smaller charge for hauls longer than the average. Two questions naturally arise; Why is there a necessity for these differences, and what should be the spread of rates?

30. Of the two the first question is the more easily answered. Something will be said later of the influence of cost of service on rates, but in this connection we may note that the cost of a short haul is greater per mile than the cost of a long haul. The reason for this is that there are certain terminal charges, which will not vary with the length of haul. These concern loading and unloading, switching and shunting in goods yards, book-keeping, etc., and will be the same whether the goods are moved one mile or 500 miles. And these charges are by no means a small proportion of the whole. They are difficult to separate from running charges, and no attempt has been made so far to do so. But no one doubts that they exist, and that they are considerable. In conversation with Victorian railwaymen, for instance, one meets with a quite general opinion that the short haul traffic, for which motor trucks compete, is not worth while to the railways of the State. No reason is given, but there can only be one; namely, that if the railways lowered their short haul rates, they would not be reimbursed for these terminal charges.

31. Railway rates might therefore be composed of (a) a charge for handling at terminals, and (b) a flat rate per ton-mile. This would achieve progression in railway rates by something like an inversion of the principle on which some taxation authorities achieve progression in income taxes; namely, by an exemption and a flat rate. But cost of service is by no means the only consideration in railway rates, although it has to be kept in mind, and when other factors are taken into consideration, the present system of quoting a lump sum per ton for each distance is more convenient. British railways have now adopted the system of a terminal charge, plus a flat mileage rate, but it is difficult to see the advantage of such a system while

the cost of terminal services cannot be ascertained.

32. The other important factor is consideration of what the traffic will bear. On account of the high proportion of overhead charges a railway needs as much traffic as it can get, and it must therefore be part of its policy to "keep everyone in business". If a customer finds it difficult to compete with others, on account of distance, it is therefore to the advantage of the railway to do all it can to meet his difficulties.

33. Take as an instance the traffic in firewood to Hobart from surrounding districts. For the first seven miles 2s. 1d. is charged, that is 2s. 1d. per ton for one mile, and a little over $3\frac{1}{2}$ d. per ton-mile for seven miles. For 30 miles, the charge is only double that for 1 - 7 miles, making a rate of just under $1\frac{1}{4}$ d. per ton-mile, and for 100 miles the charge is 10s. 7d., making a rate of $1\frac{1}{4}$ d. per ton-mile. At 250 miles the rate is only $\frac{3}{4}$ d. per ton-mile, and at 315 miles there is a maximum charge, so that nothing is paid for any additional haulage above this point. Little firewood would be hauled less than about 15 miles or more than 100 miles, so that rates for distances below and above these limits are probably ineffective. But the rate would be effective for other commodities coming within the class, such as empty boxes, bark, cement blocks, gravel, stone, etc., both below and above these limits.

34. The reason for the graduation in the rate on firewood is plain. The freight is a great part of the cost of production, and too high a freight would make wood cutting impossible. Firewood at the Hobart station brings from 13s. to 17s. per ton, and is retailed at 30s. per ton. Most of it brings 16s. to 17s. wholesale, and one may take 16s. to be an average price. The cost of carting it from

the station, cutting into smaller pieces by circular saw and retailing is therefore about 14s. per ton, and this would include no more than a fair profit to the retailer, who is subject to keen competition and usually performs some of the work himself. These facts are mentioned because they may throw some light on the expenses of the woodcutter in the bush. He has to cut the wood by hand, not by machinery, cart it to the station, sometimes long distances, and load it on trucks there. His expenses would probably be quite as high as those of the Hobart retailer, if he looked for the same standard of living, but he usually has to be content with a lower standard, and his expenses per ton must be put at 10s. to 12s. Wood is, in fact, sold at railway sidings at about this price.

35. It would probably be fair to assume that the average length of haul for firewood is about 20 miles, and the rate for this distance, 2d. per ton-mile, should therefore be approximately the average rate. All these figures are only rough approximations, but they will serve to show the principle involved. The man sending wood to a station 20 miles from Hobart, would therefore pay 3s. 4d. in freight, and could land his wood in Hobart at from 13s. 4d. to 15s. 4d., and with an average selling price of 16s. would make a profit. But if the wood cutter sending wood to a siding 50 miles from Hobart had to pay the same rate, his freight would be 8s. 4d., and assuming that his expenses are the same he could not land wood in Hobart at less than 18s. 4d. to 20s. 4d., and as wood in Hobart brings an average price of only 16s., he would have to go out of business unless he was satisfied with a far smaller return than the man at 20 miles. In the case of firewood, this may in some cases be possible, owing to the fact that the forest near at hand would be cut first,

so that the man at 20 miles may have a longer distance to cart to the station. But this may not be the case with other commodities in the same rate class, although smaller costs in other directions often do make up for distance.

36. For this reason rates have to be graded, or "tapered" to use an expression more familiar with railwaymen, otherwise the producers at a distance would be at too great a disadvantage, and their business would vanish to the detriment of the railway. There is also the factor of competition. A railway rate that is too high at, say, 50 miles, may mean that woodcutters would go a little further afield on a water or road route. The railway is able to make the rates progressive on account of being able to charge more on shorter hauls, and because longer hauls cost less per mile, and there is an additional inducement to do so in the larger amount of traffic the practice will bring.

(e) Rates on Manures.

37. An analogous, yet somewhat different case is that of manures, distributed chiefly from Hobart to the rest of Tasmania. In this case the grading on Tasmanian railways is sharper than in the case of firewood. The rate for the first four miles is 2s. 6d., (firewood 2s. 1d. for 7 miles) and it keeps higher for some distance, and then becomes approximately equal, and finally becomes lower, with a maximum of 15s. 10d. at 300 miles, as against a maximum of 16s. 9d. at 315 miles for firewood. The difference between the two is that one is a traffic of collection at Hobart and other centres, while the other is a traffic of distribution from Hobart. Leaving competition out of the question for the time, there is another factor of importance here. The manure, chiefly superphosphates,

is used by farmers to increase their crops. They can grow crops without it, but they will grow better crops with it. The question is one of whether the use of superphosphates will ensure a net return to the farmer which is greater than the old return by more than the price of the superphosphates. It is therefore of interest to the railway to keep the price of Hobart superphosphates within the reach of farmers, no matter what the distance from Hobart.

38. There is a number of other issues to be considered, but they would lead too far afield if taken in detail. The farmer near Hobart will be more likely to use manures even at a higher price, because his land is dear and therefore needs more intensive cultivation; because it has probably been in use longer and is therefore more exhausted than the land further afield; because he has the advantage of smaller freight on his produce. The farmer in the remoter districts and the pastoralists of the Midlands will have less inducement to use manures, but will do so providing the price is low enough.

39. The railway therefore has this inducement to level prices in different localities by tapering freight rates. In the north and north-west of the Island there will be the additional inducement of competition. Manures are, for instance made at Yarraville in Victoria and a number of other places which have direct steamer communication with Launceston, Devonport and Burnie. It would perhaps be impossible to compete at and around these centres, but competition is possible at centres in between. Devonport, for instance, is 193 miles from Hobart by rail, and the freight on a ton of manure from Hobart would be 14s. A steamer freight of less than 14s. would therefore drive the traffic to Melbourne instead of Hobart. Deloraine,

on the other hand, is an important agricultural district inland, with Devonport as the nearest port. It is 156 miles from Hobart, and the freight there would be 13s. 5d. The railway freight from Devonport to Deloraine (37 miles) would be 4s. 10d., and the steamer freight in this case would have to come below 9s. 2d. to compete.

40. In this case the competing point is nearer Hobart than the port, but the same thing would happen even if the competing point was further from Hobart than the port, the only difference being that the margin would be slightly smaller. Nietta, for example, is 33 miles south-west of Devonport, the freight there would be 4s. 6d., while the freight from Hobart (226 miles) would be 14s. 7d., leaving a margin for steamer freight of 10s. 1d. as against 14s. to Devonport.

41. It would therefore pay the railways to charge a slightly lower freight at points where competition comes in. To meet competition the railways might charge a lower rate to Devonport than to Deloraine, as intermediate point, or at least charge what the Americans call a "blanket rate", that is, the same rate to Devonport as to Deloraine. In practice, this is done.

42. Ripley quotes some remarkable cases (3) of roundabout routing owing to factors such as these. In addition to the many overland and river routes between the Atlantic and Pacific coasts in the United States, there was at the time Ripley wrote the Cape Horn route, and is now in addition the Panama route. It was difficult for railways to compete with the cheap water rates on the Pacific Coast, but they did their best by charging higher rates at intermediate points. They would charge water rates to Pacific Coast ports, and charge water rates plus railway rates from

the coast to intermediate points, so that within a certain distance from the coast, the rates by rail from New York would vary to some extent inversely with distance. The case was not quite as clear as this, as it was complicated by competition between the railways themselves, but the illustration serves to show the point made. Naturally, this led to some extraordinary anomalies, while the rate wars were in progress. Ripley (4) quotes one case of machinery being carried from Chicago to San Francisco by way of Shanghai for 15 cents less per hundredweight than by the direct route. Similarly, machinery from Denver, Colorado was shipped to Sydney, N.S.W. via Chicago for half the rate it would have had to pay on either of the more direct routes via San Francisco or Galveston, Texas. When discriminations in rates go as far as this, they are a positive evil, and it is by far better to stick to the simpler systems, even if they have disadvantages.

(f) Degree of Graduation.

43. The second question, namely to what degree rates should be tapered, is a more difficult matter. One might repeat McCulloch's dictum of progressive taxation, that "when we abandon proportion, we are at sea without rudder or compass". Rate fixing is a matter of trial, error and re-trial. Each railway system has its own problems to face, and can only find the way to the best grading by experience. But two broad principles set useful limits to maxima and minima. As has already been stated, cost of service should form a basis, but the cost of a particular service is too difficult to ascertain, except in a fairly arbitrary manner. The cost of service principle is therefore inadequate, but is useful in two ways. First of all the railway must be reimbursed for any service it renders, or at least be reimbursed for any

extra cost it has for the particular service. That is, all the direct costs of the service must be realised together with some contribution, however small, towards overhead charges. Secondly, the cost of service principle is useful in supplying the rate fixing authorities with a criterion of fairness in the general level of charges. Australian railways, with the exception of those of Western Australia, are not reimbursed for all their costs, but an idea of costs of service might help them towards better systems. The cost of service system sets a useful lower limit, below which individual rates should not fall, and also a limit above which the general level of charges should not rise.

44. The principle which sets the other limit is that of "what the traffic will bear", which is really the principle governing all industries with joint costs. The total return for all output must cover all costs; the individual articles or services produced are sold at varying prices governed by market conditions, but at all times above the sum of costs directly attributable to them. As long as they bring in some part of the overhead costs they are profitable, but obviously some of the other products must bring in larger shares of these costs, otherwise the whole industry would be run at a loss.

45. But this question belongs to the sub-section following, and will be treated in greater detail there. The question to be considered immediately in the knowledge of these facts is, what principle, if any, should govern the spread of rates over distance.

46. Graphs D, E and F show all the chief rates for Tasmania over 125 miles, the Victorian rates over 250 miles, and the rates for manures in all States for 250 miles

respectively. None of these graphs show any easily discernable trend. Of the Tasmanian rates the five lower, A, B, C, D and M move fairly closely together on nearly the same upward grade, but it will be noticed that the lines for various grades cross and recross one another. Classes A and C run very closely together, but while one is a smooth line the other moves up in a series of steps. Class C has distinctly higher rates from 1 mile to 30 and again from 70 miles to 90. The rates are roughly the same between 30 and 70 miles and between 90 and 110 miles, after which it is definitely below A rates, and never rises above again. Classes B and D likewise run together and cross each other, but class D rises earlier than B, although the latter reaches a higher level ultimately. The three rates most nearly corresponding of these are M, A and B, which are almost parallel most of the way.

47. The four higher rates form another distinct group, and are somewhat different in construction. They consist of a flat rate over short distances (11 to 13 miles) and then rise very steeply, but at different angles. Class F has a rate constructed on very different principles from any of the others. It rises fairly steeply, with one break, at first, and then flattens out, becoming more nearly horizontal than any other.

48. The Victorian rates, shown in Graph E, present much the same appearance. As in the case of Tasmania, the curves of the higher rates keep clear of each other, but the lower present the same tangled appearance, crossing and recrossing one another. The rates for grain and S.A.P., for instance, each cross two other rates.

49. Even more instructive for present purposes is Graph F, showing charges for the same commodity in different

States for the one kind of goods, namely manures. The dominant consideration in this case is probably that of assistance to agriculture. Manures will not stand high freights, and as is shown on the other graphs the rate is the lowest in Tasmania with the exception of coal, and the lowest in Victoria. But Graph F shows that the rate in Tasmania rises very sharply compared with the rates in other States, except South Australia and the Commonwealth railways. The latter probably carry little of this class of goods, and are therefore unimportant. But the rates in South Australia and Tasmania are constructed on widely different principles. The South Australian rate is a flat rate up to 22 miles, and then rises sharply, while the Tasmanian rate rises sharply from the start and then eases off, the curve coming quite as closely to the horizontal as those of the lower rates.

50. The reason for the sharp rise of the South Australian rate is difficult to explain, but the Tasmanian rate is higher than the others simply because the light traffic on Tasmanian railways makes it necessary for the lower grade commodities to carry a greater proportion of overhead costs. The rate eases off somewhat at 110 miles and still more at 140 miles, because at these distances water competition is likely to become severe.

51. The other rates are all lower, but are all made on different principles. The Western Australian rate shows an even grading, the New South Wales and Victorian rates are more irregular, but seem to average about the same, although the New South Wales rate gets its rise in earlier than the Victorian, and shows a gentler rise for longer distances. The Queensland rate has the most peculiar curve. It has a flat rate over the first ten

miles, and then rises as sharply as the higher rates, after which it has another flat rate extending over 70 miles. Finally it rises at nearly the same angle as the much higher South-Australian rate. Were it not for this stretch of flat rate the Queensland rate would have followed the higher rates to 150 miles and then taken a middle path between the South Australian and Tasmanian. Probably the flat rate between 25 and 95 miles is a "blanket rate" caused by competition at the latter point. An enquiry brought no satisfactory reply, but this seems the most likely explanation. The only cause known is apparently that the rate was once quite logical, but that it has been altered from time to time at the request of shippers.

52. The "taper" of rates over distance, therefore, can follow no one rule, but must in all cases be guided by trade conditions. The problems of competition and other trade factors met with in one territory will not re-occur in another, which will be subject to other and entirely different conditions, demanding a different solution. Australian rates are, after all, comparatively simple. American rates are far more puzzling, and cross and recross one another to a far greater extent. The reason is that competition is far keener in the United States with rival railway companies, which hardly exist here. Competition by water is fairly common in Australia, particularly in Tasmania, and competition from road transport is growing sufficiently to have some effect on rates, but railway competition is rather unusual, although it does exist.

(g) Classification of Goods.

53. The detail of the classification of goods in a railway tariff can be imagined by the bulky nature of goods rates books. Ripley mentions among curiosities in

American lists "pie crusts, prepared", artificial hams, wings, crutches, baby jumpers, and "shoe flies"; we have in Australian classifications such strange names as "Aid-U, produce of the Commonwealth", Bevara beer, blackboy tree chips, blanketta, bricktor, card flyings, switchback railways, title deeds, tyre doctor, and wash easy, just to mention a few of the first and last items of the Victorian tariff.

54. But this is not all. The Victorian tariff makes a number of classes for barley, according to whether it is used for seed or consumption, whether processed or not, whether home or foreign produce, and the direction in which it travels. The New South Wales tariff divides rabbits into preserved, boned, frozen, chilled and merely dead, but in the latter case does not mind if they are "amalgamated" with hares, while in the Queensland tariff they are either tinned or just dead. The item indicating most of the problems met with is probably that of wine in the Victorian tariff. The following considerations are shown:-

1. The familiar one of class of packing and quantities forwarded.
2. Whether is foreign wine or produce of the Commonwealth.
3. Whether it is consigned to places within Victoria, to other States, or direct to the seaboard for export.
4. Wine returned to the original consignor as faulty will be taken at half rates, if previously sent by railway.
5. Special low rates are provided for wine consigned to distilleries for distillation or to vinegar manufacturers for making vinegar, provided it is proved that the wine is so used.
6. In addition there are special "district rates" for goods going to Melbourne and "Melbourne and beyond" by which vignerons benefit.

55. There is considerable discrimination in the rates. Wine, "n.o.s." (not otherwise specified), which

apparently means foreign wine and wine exported from other States to Victoria, pays Class 2 rates, which is £3.5.0. for 100 miles, and £6.2.3. for 200 miles, while Australian wine for export in a minimum consignment of seven tons pays the same rate as grain, which is 10s. 7d. and 13s. 11d. for these two distances. (5)

56. The tariffs of the other two chief producing States, New South Wales and South Australia, are not quite as complicated, but make some of these distinctions, while to the Tasmanian, Queensland, Western Australian, and Commonwealth railways it is all merely wines in different quantities and packings. The Tasmanian tariff, however, shows an intense interest in breweries, and the classification of their products according to destination and other considerations occupies a whole column in the small rate book. And apples, which in some States is merely some such thing as "Fruit, fresh, n.o.s.", also has a mass of classifications; There are even two different rates on apple peelings.

57. This gives an indication of some of the problems met with in the classification of goods in railway rates, and again one is faced with two questions; Why are these classifications necessary; and are they justified? The second question, being the simplest, may be dealt with first. This involves the application of the law of increasing returns and the principles of joint costs.

58. It has been seen that other industries with joint costs sell their goods at varying prices, so that the net return covers all costs. The prices received for the different commodities are fixed by market conditions; they must be sufficient to cover the direct costs involved in the making of the particular product, but will not always cover the same proportion of overhead charges. Some

products will bear only a small fraction of these, others will be able to bear a larger proportion. All that matters is that all the products should together return all costs.

59. The railway is in exactly the same position:

Some goods are able to bear higher freight than others, sometimes because they have a high value in proportion to their bulk or weight; sometimes for other reasons. It must be understood that this in itself is not a justification for differentiation. It is a reason for differentiating, but the justification lies in the fact that railways are subject to the law of increasing returns. Taussig (6) sums up the position in a few words:-

"There is much hazy talk among persons who have given attention to railway matters, but have not been versed in general economics, - such as railway managers, and judges and public officials concerned with the enforcement of rate regulation. These often speak as if it were obviously and intrinsically *just* that a commodity having a higher value should be charged higher freight rates. It must be confessed that some trained economists have spoken in the same loose way. Yet no one would apply such a notion to transportation by pack mule or wagon The justification of charging what the traffic will bear must rest on a further principle: namely, that it conduces to the fullest utilization of the railway*.

60. This puts the case very simply. The justification of the differentiation in rates lies in the fact that more service is obtained by the community by this plan than by charging uniform rates for all goods. Some goods cannot pay their full share of joint costs, and if an attempt were made to charge the full share the railway would lose the traffic, which would not be made up by larger quantities of higher grade goods on account of lower rates in their case. On the other hand, the chances are that even the higher grade goods would in the long run have to pay the high charges, as there would be fewer ton-miles into which overhead costs could be divided.

(h) The Question of a Minimum.

61. For an illustration we may return to the investigation mentioned in connection with the cost of carrying coal. The investigator took all costs in connection with the traffic, including a proportion on a mileage basis of overhead costs, and found, according to our assumption, that the cost of carrying coal was 2½d. per ton-mile. At this rate the traffic would pay a full share of all costs, so far as they can be ascertained, and this should therefore be the rate for coal, if the traffic could bear it. But was this the lowest rate at which the railway concerned could carry coal? If coal producers had to close their mines because this freight was prohibitive, what course should the railway take?

62. According to Ripley's formula, which we will assume to hold good in this instance, two-thirds of railway costs are "constant" and only one-third "variable" directly in proportion to traffic. Whether the railway carries coal or not, two-thirds of its expenditure will remain at the same figure; there will only be an addition to the one-third variable cost. In the case of coal on the railway concerned this third will amount to 0.83d., and this is therefore the lowest limit to the rate. If the railway carries coal at lower rates than this, it is actually losing on the traffic, because it incurs expenditure directly by the traffic, for which the traffic is not paying. The case would be analogous to that of making manure from blood and bones in a meat packing plant. Unless the manure returned more than the actual cost of making it, this traffic might as well be given up if it did not return costs actually incurred by it. If, on the other hand, the railway was able to charge 0.9d. the traffic

would pay, because it would contribute 0.07d. towards overhead costs, which could not be got without it.

63. Previously total cost of service was set as a useful upper limit, above which rates in general, or average rates, should not rise. In specific rates there is in these "prime" costs a lower limit, below which traffic cannot be undertaken. The principle of what the traffic will bear provides an upper limit, beyond which the traffic will be lost. The determination of this upper limit is not always easy, and is merely a matter of trial and error. Using the case of coal again, we will assume that the railway charged rates which averaged 1d. per ton-mile, and at this rate had a yearly traffic of 100 mill. ton-miles. This would bring in an annual revenue of

£416,666

Using round figures we will assume the direct costs of the traffic to be 0.8d. per ton-mile, instead of 0.83d. ... 333,333

Leaving a contribution of ... £83,333

Towards overhead charges. Assume now that the railway considers this rate too low, and raises it to 1½d. per ton-mile. It is bound to lose some traffic and if the coal is exported may lose a great deal. Let us say that the traffic drops to 80 mill. ton-miles. The revenue would then be ... £375,000 and the direct costs still at 0.8d. per ton-mile would be ... £266,667

Leaving a surplus for overhead of.. £108,333

The higher rate would therefore have brought a higher net return by £25,000. But if the traffic dropped much lower, say to 60 mill. ton-miles, the revenue would be ... £281,250 and the direct costs of the service... £200,000

Leaving a contribution of only ... £81,250

towards overhead costs, and a net loss of £2,083. With such a substantial increase in rates as that assumed here, namely 12½%, such a diminution in traffic would not be impossible. If the mines concerned relied on export

to markets with competition from other sources, a much smaller rise in freights might cause a serious diminution in output. Coal is notoriously dependent on freight rates. There are times, for instance, when Australian coal will reach India and even Aden with favourable freight rates. At other times, when there are empty ships going to Australia for the wheat harvest, English coal will reach as far as Singapore and even Adelaide.

64. Were the commodity under discussion any other than coal, or were the railway concerned not a State railway, the obvious thing to do in this instance would be to charge 14d., if the traffic did not fall below about 70 mill. ton-miles, which would give a fair favourable margin, and to try a slightly lower rate if it fell as low as 60 mill. ton-miles. Railway managers must always seek the highest possible earnings, provided that the interests of the public are safeguarded at the same time. It may even be in the public interest that the rate on some commodity should be raised as high as to curtail traffic; it may allow lower rates on some other commodity, the producers of which will benefit by more than the loss to the producers of the other plus the cost of any dislocation caused. In such a case there would be a net benefit to the community. But it is difficult to measure the effects of such changes.

65. The case of coal is, however, on a slightly different footing, and other considerations of importance enter into the question of the rates to be charged on this commodity. Coal is a commodity essential to nearly every industry in the country, and even to the railway itself. It enters into industrial costs more universally than any other raw material, and this fact cannot be overlooked by railways, even assuming that they are private railways, putting the interests of their own shareholders above those

of the community. It is essential to the railway that its customers should be as prosperous as possible, and if the costs of the industries within the territory of a railway become high enough to curtail output, the railway will suffer a loss of freight. It may, therefore, pay a railway to carry coal at a very low rate. Circumstances could be conceived under which a railway would carry coal at a rate that would not return the extra costs incurred in the traffic; It may be looked upon as a *sprat to catch a mackerel*. And not only is this the case with coal. There are other commodities, which may in given circumstances present much the same problem.

(i) Differences between State and Private Railways.

66. In the case of State railways there are the further considerations of the general welfare of the community, and they may carry such a commodity as coal at a loss with far less assurance of new freight to make up the loss than a private railway would consider. Bound up with the management of State railways are also political considerations which have their effect on rates to a far greater degree than is generally realised. If assistance is to be given to a struggling industry, the railways often provide a convenient method of giving such assistance by way of lowering freights. Railway earnings in such cases often become a secondary consideration, and there will possibly be a loss in some cases. No investigation, apart from that mentioned, has ever been undertaken in Australia to show whether there is such a loss in specific instances. But one may infer from the fact that all State railways in Australia show an annual loss, some a loss of considerable dimensions, that some part of this is due to such "political rates". Brigden and Giblin (7) even go as far as to

say that the whole of this may be counted as aid to primary production, although they express the opinion that the statement needs some qualification.

67. But that such considerations play a big part in the making of rates on State railways is evident from the construction of the Victorian rates on wine and the Tasmanian rates on beer. There are discriminations in Victoria against foreign wine and wine from other States, there are special "district rates", and there are exceptionally low rates on wine for export. Some such discriminations would probably be made by private railways for their own good, but it is doubtful whether they would be made as wide as these mentioned. The same is the case with the Tasmanian rates on beer, which has particularly low rates to possible export points. As possible export points are also possible import points, the low rates apply only one way, i.e., from Hobart and Launceston to ports, and not from other ports to Hobart and Launceston.

68. This is something a private railway is not likely to do, unless its rates are controlled. It wants to encourage traffic, but does not care whether this traffic is economical from the point of view of the community or not. Ripley (8) quotes a statement by an American railway manager which is illuminating:-

"I should be just as much interested in the stimulating
 "of Chicago manufacturers in sending their products
 "into New England to sell as I would be in sending
 "those from New England into Chicago. It is the
 "business of the railways centering in Chicago to
 "send the products of Chicago in every direction.
 "It is our particular business in New England to
 "send New England products all over the country.
 "The more they scatter the better it is for the
 "railways. We are glad to see the same goods
 "come from Chicago into New England that are
 "manufactured and sent from New England to Chicago".

On this reasoning, Mr. Tuttle, were he Commissioner of

Railways in Tasmania, would be as much interested in encouraging Tasmanians to drink Victorian beer as he would be in encouraging Victorians to drink the Tasmanian beverage. However much waste State owned railways may be responsible for, they would not be responsible for this. Superfluous transportation is wasteful in the extreme, and transportation must not be encouraged for its own sake.

69. In respect of coal there are in some of the States a mass of similar classifications. New South Wales and Queensland both have differential rates for coal for export or Ship's bunkers, and Victoria has a special rate from Victorian coalfields to Melbourne, but not beyond or to any other station. This is probably for the same purpose, but will incidentally tend to encourage the centralisation of manufacture around the city. Against this the Victorian Railways have special low rates on raw materials for country industries and also low rates for the finished products of these industries. These amount to a $26\frac{1}{2}$ and $28\frac{1}{2}\%$ reduction in rates for raw materials and a 15 to 20% reduction in rates on finished products.

70/ Tasmania has the lowest rates on coal of any State (9) chiefly because Tasmanian coal is a product of a much lower grade than that of the other States. Nor is there any differentiation against "foreign" coal, as for steam generating purposes Tasmanian coal must be mixed with a proportion of higher grade coal.

71. The discussion so far has attempted to show that there is a bewildering number of factors influencing the fixing of rates both in regard to distance and the nature of the commodities carried. There are naturally many other considerations of the same nature as those discussed, but there is one of outstanding importance, which deserves fuller

treatment, namely the question of competition.

(j) Summary.

72. A summary of the principles involved in rate-fixing may now be attempted:-

1. Railways have a large proportion of overhead costs, and as a result an increase or decrease in "output" does not involve a proportionate increase or decrease in costs. A large proportion of the costs in railway working are also joint costs, which cannot be allocated to any particular service.
2. The "output" of a railway consists of a mass of heterogeneous services. These services cannot be charged for according to cost, as there are no means of finding the costs of any particular service. Nevertheless, costs in the aggregate form a useful lower limit, below which the return from freight and passenger rates in the aggregate should not be allowed to fall.
3. In the first place it is difficult to say what portion of the total costs should be borne by passenger traffic, and what should be charged to goods traffic. The division must be made arbitrarily, and in Australia a passenger is carried one mile for roughly half of the rate charged for one ton of goods carried one mile.
4. The matter would be simple if it were possible to merely estimate the total expenditure for the year and the total of passengers and freight offering, and then calculate a standard rate per passenger-mile and goods ton-mile to be applied to all passengers and all goods. But some goods would not be shipped if they had to pay this standard rate, and lower rates will have to be offered to induce their shipment.
5. Such goods, which are generally goods of low value in proportion to their weight and bulk, can be carried at lower rates, the minimum being determined by the direct costs of handling them. If such goods recoup the railway for the direct costs plus the smallest proportion of overhead costs, the traffic will pay the railway, as the overhead costs would have to be undertaken whether the traffic were procured or not. Any contribution towards it is therefore a gain. Here Ripley's formula is of importance in giving an idea of the extent of these overhead costs.
6. But in order to carry such goods at less than "standard" rates, the railway must charge some other goods more than the standard. The result is that railway tariffs divide goods into classes, and fix different rates for each class. The lower limit for these individual rates is the direct cost of handling the goods, and an upper limit is set by what the traffic will bear. To find this upper limit is a matter of trial and error. Too high a rate will restrict traffic, and a lower rate may, by inducing more traffic, secure a greater net

contribution towards overhead charges.

7. Classifications of goods will differ between different countries, according to local conditions. The chief points taken into consideration are: The value of the goods, quantities forwarded, class of packing, whether of local or foreign origin, whether for home consumption or export, competition the commodity may have to meet, and competition with the railway for its carriage.
8. This classification gives an average rate per ton-mile for a given commodity, but this average rate cannot apply to all distances, otherwise goods coming a long way to market cannot compete with goods having only a short distance to come. Rates must therefore be graded or "tapered" according to distance, a lower rate per mile being charged for 100 miles than for 50. The average rate would be paid on goods travelling the average distance; over shorter distances the rates have to be higher in order to allow rates lower than the average for longer distances.
9. Greater cost per mile of short hauls also gives a justification for the grading of rates over distance. The greater cost of short hauls is due to services performed at terminals, which remain the same independent of the distance the goods have travelled. In Britain this has given rise to the custom of charging a fixed terminal charge plus a flat rate per mile, which in effect means the same as the Australian practice of charging a lump sum for any given distance. As terminal charges are not easy to ascertain, they form no guide, and different railway systems have different methods of graduation to suit local conditions.

VIII. THE EFFECT OF COMPETITION ON RATES.(a) American Examples.

1. Competition with other lines has given rise to some curious anomalies in railway rates, particularly in America. Hadley's famous case of rates on oysters on the Delaware Coast seems too familiar to be quoted again, (1) but there are numbers of other cases, perhaps not as simple, but equally instructive. They all come down to this, that where two railways run from X to Y along different routes, and therefore in competition only at these two points, the rates between X and Y may be lower than the rates at intermediate points. This is what Hadley justifies in the oyster case, and it is accepted by Kirkaldy and Evans as correct. (2) Ripley, however, points out that the justification must be qualified. Of the two routes one will in most instances be longer than the other, and it is quite right that the longer road should come down to the rates of the shorter in order to share the traffic. By doing so it may be able, by means of the larger traffic to charge lower rates than it otherwise would at intermediate points, and shippers at these points would have no cause for complaint. The shorter road must of necessity set the rate, and the longer road must accept this or lose traffic, thereby increasing overhead charges on the traffic it retains.

2. Ripley (3) quotes the case of rates between Pittsburg and New York. There were two competing routes, one going directly east, while the other went first west, then north via Youngstown, Ohio, and then east. Both lines were owned by the same company, and when the direct line was busy, which was a frequent occurrence, traffic from Pittsburg would move by the roundabout route. Shippers

at Youngstown started to complain because freight from Pittsburg, which actually passed through the town on its way to New York, paid lower rates than their own freight. The reply was that Pittsburg was actually a shorter distance from New York than Youngstown by the most direct route, and therefore had a right to the lower rates. This was not actually a case of competition, but illustrates the principle.

3. Quite a different case would be presented if the intermediate point paying higher rates were on the shortest route. This would mean that the shorter railway, having the natural advantage, would have entered into cut-throat competition to deprive the longer road of traffic, and could possibly only do so by making customers at intermediate points make up for loss on the longer haul. This sort of discrimination gives rise to endless abuses, and cannot be defended.

4. Railways competing for traffic may, of course not necessarily be parallel, or even run between the two same points; they may run in opposite directions. A case in point is provided by the American trans-continental railways and the railways of the Atlantic seaboard, which have been in competition in the fruit traffic to the large cities of the New England States and New York. By close co-operation between shippers and railways the Californian fruit growers have been able to capture most of this trade, although the distance is very much longer.

(b) Australian Railway Competition.

5. One of the few instances of competition between railways in Australia is of this nature, that is, the competition between the New South Wales and Victorian railways for the trade of the Riverina. A concrete case was brought before the recent Royal Commission enquiring into

the Victorian Railways. A witness representing the jam manufacturers of Victoria complained to the Commission that the freight on jams and sauces from Melbourne to Wagga, New South Wales., a distance of 267 miles was £8.17.2. per ton, while the freight from Sydney, 325 miles, was £2.13.0. to £3.15.8. per ton, according to the quantity shipped. (4) He told the Commission that it paid manufacturers to ship to Sydney by steamer to take advantage of the lower New South Wales rates. In this way their freight could, after travelling 948 miles, reach Culcairn, New South Wales, at a cost of £5.3.8., whereas the cost on the direct route (221 miles) was £7.1.11. He further stated that while the Victorian Railways charged £5.15.11. a ton from Melbourne to Albury (191 miles,) they charged £4.16.0 a ton to Mildura (351 miles) because of water competition (via the Murray to South Australia) at that point.

6. The reason for this anomaly was explained to the Commission by Mr. W. E. N. Keast, General Passenger and Freight Agent of the Victorian Railways. (5) He explained that the Victorian railways were at a disadvantage in the Riverina jam trade for two reasons. One was that the classification of jams and sauces in the Victorian tariff was higher than that of New South Wales, and the other that interstate traffic was charged on the basis of the sum of the rates of the two states, instead of on a tapering through rate.

It appears that the Victorian classification of jams and sauces is Class 2, which is the highest rate. The same rate applied in New South Wales until 1923, when these products were put into Class 1, which is lower, and in the following year there was a further reclassification, reducing full truckloads to Class A, a minimum shipment of 3 tons to Class B, and smaller shipments to Class 1.

Finally in 1926 the minimum shipment under Class B rates was reduced to one ton. In the meantime the Victorian rates remained at Class 2, and the result was that Victoria could only compete with small shipments under one ton.

7. Victoria refused to lower rates, because it could not do so in interstate traffic without reducing rates also within the State, and this was considered to involve a loss. The Commonwealth Constitution Act provides that interstate freights must not be reduced without intra-state freights being reduced in proportion, unless the other State concerned agrees to such special reduction. It could under the circumstances not be expected that New South Wales would agree, seeing that the State had lowered its freights with the obvious object of keeping the trade. By an agreement between the States, concluded in 1905, certain competitive rates were fixed and the special rate from Melbourne to Mildura was one of these.

8. There was a number of other considerations involved in Victoria's refusal to lower rates on these products, one being that it would mean that Victorian country industries would be deprived of some of their present advantages in rates, enabling them to compete with Melbourne manufacturers. It was not stated in Mr. Keast's evidence whether the anomaly in regard to rates on jams and sauces was typical of most freight to the Riverina, but one must infer that the case was an isolated one, and that in other goods Victorian businessmen do not suffer excessively from loss of trade on this account.

9. The matter of through rates in place of the present arrangement of charging the sum of the two rates is of more general concern. An example will best show how this works to the disadvantage of Victoria in the Riverina.

The rates for Class B are the ones most nearly corresponding in the two States, and a ton of goods of this class, such as agricultural implements, could be sent from Sydney to Wagga (325 miles) for £3.15.8. The same consignment leaving Melbourne would have to pay the Victorian rates for the 191 miles to Albury, amounting to £2.10.2, and then the New South Wales rate for the 76 miles to Wagga, amounting to £1.10.9, making a total for the 267 miles of £4.0.11. The New South Wales rate, despite the longer distance, is therefore 5s. 3d. less than the Victorian. If, however, a through rate was charged on the Victorian basis, the rate would be £3.1.4, or 14s. 4d. cheaper than the New South Wales rate, which is perfectly in keeping with the two different distances. (6)

10. This has been a problem confronting the Australian railways for many years. The question of introducing through rates in interstate traffic was under consideration by the railway commissioners of the States for some considerable time, but was finally rejected, and was also rejected at the last conference of State Premiers in Sydney because of the financial effect on some State railways. There is difficulty in getting an agreement, because the adoption of through rates generally would cause a net loss of traffic to some States and a net gain to others. Nevertheless it is questionable whether in the interests of interstate commerce generally a more earnest endeavour should not be made to get the system of through rating adopted.

11. Through rates between Victoria and New South Wales do exist in two special instances. They are the rates to stations in New South Wales on the Deniliquin and Balranald lines, which are continuations of Victorian lines on New South Wales territory, and are operated by the Victorian Railways' Commissioners.

(c) Competition by Water.

12. Water transport is the most serious competitor with railways. The cheapness of water transport is proverbial. Transport on land has its greatest expense in providing the roadway over which to travel; on the sea the road is free, and only the vehicle has to be provided. In addition terminal charges are lighter by reason of the fact that there is no seaport without ambition to outdo its rivals in trade; port charges are therefore made as light as possible to attract trade.

13. The best example of the cheapness of water transport is probably that of the trade between the Atlantic and Pacific coasts of North America. A great deal of the trade now naturally goes via Panama, but before the Panama Canal was opened American railways had to meet competition from water transport round Cape Horn, going a distance five times as great. How this affected transcontinental rates has already been mentioned. For Britain the same problem has arisen, but there the "port-to-port" rates of the railways have considerably reduced the coastwise traffic. The costs of the coastwise traffic have gone up chiefly on account of high port dues, and the shipowners unsuccessfully appealed for a prohibition of special railway rates. They did, however, secure some measure of regulation. (7)

14. Those of the Australian railways which connect various ports therefore find shipping a serious rival, and the general result is that through freight from port to port does not generally go by rail, except to gain time. Fast traffic inevitably falls to the railways, but it is difficult for the railways to compete in the general goods traffic. Some attempt is made, however, by making special

rates between ports. It is difficult to find any concrete instances, from published rates, except in the case of Queensland. This State follows the admirable practice of publishing in annual railway reports the reasons for the fixing of special rates between specified stations. The last report (8) gives particulars of 27 new rates. Most of the reasons given are assistance to local industry, or that the traffic concerned is export traffic (chiefly coal) but in four instances shipping competition is given as the reason for the special rate. The report for 1924/25 gives another three instances of lowered rates on account of water competition. One instance is that of the traffic in kerosene and motor spirit from Rockhampton to Gladstone. The distance is about 55 miles, and the ordinary rate on motor spirit for this distance is £3.3.7, but the rate has been reduced on account of water competition to £2.

15. The State suffering most from water competition with its railways is naturally Tasmania. The Main Line runs between Hobart and Launceston, the two chief ports of the State, and the Western Line touches a number of excellent ports. In addition the Derwent Valley line has to meet competition by river to New Norfolk. Omitting the latter the competition is not that of parallel lines, but rather in the nature of the competition between Victorian and New South Wales railways in the Riverina. That is, the competition is not with ships running between the various Tasmanian ports, but with ships from Mainland ports, notably from Melbourne.

16. This accounts for the fact that Tasmania's interstate trade is two and a half times as great per head of population as the average for the States (in volume). (9) The ease with which shipping can compete with railways has

in fact made Melbourne the chief distributing centre for the trade of Tasmania's northern, north-western and western districts.

(d) Effect on Tasmanian Rates.

17. Naturally this competition has had its effects on rates. The simplest instance is that of traffic between Hobart and New Norfolk, in which case a maximum charge of 7s. per ton has been fixed. The distance is 25 miles, and for this distance the charges for Classes A, B, C and D are lower, and are therefore not affected. But in the higher classes, the maximum means considerable reductions, notably in the three numerical classes. The charges for these over 25 miles are Class 1, 14s. 10d.; Class 2, 18s. 3d.; Class 3, 19s. 5d.; and the reductions therefore amount to 7s. 10d., 11s. 3d., and 12s. 5d., respectively. The maximum of 7s. only applies to New Norfolk, so that rates at intermediate points are higher. The rate on Class 3 goods to Red Gum, $1\frac{1}{2}$ miles nearer Hobart than New Norfolk, would be 17s. 11d. In this instance residents of Red Gum would probably book their goods through to and from New Norfolk, and cart them home the extra distance. Graph G shows more clearly how rates are affected.

18. Reductions in rates between Hobart and Launceston and along the North Coast are more complicated. Before considering these as a whole, a special and rather interesting case may be mentioned, namely that of rates on beer from Hobart to the northern ports. The case is interesting in that it closely resembles the Californian fruit case mentioned earlier (Paragraph 4 of this section). Two years ago the rates on ale and beer to these centres were considerably higher than they are now, because the shipping

competition did not exist.

19. There was at that time a brewery sending its products to the North and North-West, but it did not suffer by Victorian competition, because the two brews were entirely different. Those with a taste for the heavy Tasmanian beverage scorned the light Victorian beer, and the clientele of the Victorian breweries were never potential customers of the Tasmanian. Then in 1927 another brewery was floated on a wave of patriotic fervour, with the slogan "Buy Tasmanian Goods". The object was to brew a Tasmanian beer sufficiently like the Victorian to drive it from the market, and with this object in view the railways were asked to lower their freights to the northern ports below steamer freights.

20. The shipping freight from Melbourne to Launceston is 19s. 6d. per measured ton, but as this is smaller than the deadweight ton used by the railways, the shipping freight is equivalent to 28s. per ton. To Burnie and Devonport, the rate is 34s. 6d. These are steamer rates, but a great deal of ale and beer is carried also by small sailing vessels, which carry timber and fish to Melbourne, and are prepared to take back-loading at almost any figure. Their rates are therefore lower, but how much lower is impossible to say. They will vary for each trip, according to the amount of cargo offering, and these vessels will go to a very low figure rather than run across in ballast.

21. The railway rates therefore had to come below steamer rates, but they decided that this could not be done for small lots. The rate to Launceston was therefore fixed at 20s., 8s. 6d. below the steamer rate, for six ton lots; for smaller shipments the rate remained at 49s. 3d. To Devonport, the rate was lowered to 27s. 6d., and to Burnie

to 31s., which makes the railway freights cheaper than steamer freights by 7s. and 3s. 6d. respectively. Again, as in the case of Launceston, the reduction only applied to six ton lots, smaller shipments paying rates higher than steamer freights; but a concession was made whereby two lots for two different stations, making up six tons, would be taken at the lower rate, plus a shunting charge of 5s. As these rates are calculated to foster local industry, they only apply from Hobart, and not the other way. The rate on beer in bulk from Launceston to Hobart, for instance, is 61. 3d., that is, more than three times as high as the rate from Hobart to Launceston.

22. The other rates affected may now be dealt with. There is a long list of special concessions between Hobart and Launceston, covering over two pages in the goods-rates book (10) and only a few selected commodities can be mentioned. The following list is fairly representative:-

Goods	Rate on Usual Basis.	Reduced Rate.	Difference.
Groceries, N.O.S.	£3.16. 5	£1.19. 0	£1.17. 5
Bluestone in kegs	3. 1. 3	2. 9. 3	12. 0
Cartons	4.10. 9	2. 5. 9	2. 5. 9
Self-Raising Flour	3.16. 5	1. 3. 9	2.12. 8
Iron and Steel, bar or rod	3.16. 5	1.19. 0	1.17. 5
Paper, Newsprint	4.10. 9	2. 5. 0	2. 5. 9
Jams and Sauces	4.10. 9	1. 0. 8	3.10. 1
Tallow	2. 9. 3	1. 2. 6	1. 6. 9
Zinc Ingots	3.16. 5	2. 9. 3	1. 7. 2

23. It will be observed that the reductions follow no special rule. In one instance, that of jams and sauces, it amounts to roughly 78%, while in bluestone it is less than 20 per cent. The reason is partly that competition enters in varying degrees, but partly also because the reduction in freight is not always entirely due to the competition. In some instances, (i.e. jam) special assistance to local industry

is a big factor. This was the case with the lowering of the rate on cartons, which is, of course, not a very important item as far as the railways are concerned. This took place recently on representations from local manufacturers, who made representations to the railway management on finding that they could not compete in the Launceston market with Melbourne manufacturers.

24. Similar reductions in rates apply along the North Coast on the Western Line from Launceston to and from Latrobe and Wynyard and Intermediate stations. Here the reductions seem on the whole to be greater than on the Main Line. The first item in the table above (groceries, n.o.s.) has a rate of £1.3.0. The distance from Launceston to Latrobe is 75 miles and to Wynyard, 124 miles, and the rate is therefore what Americans call a "blanket" or "postage stamp" rate over 49 miles. On the usual mileage basis the charge on groceries from Launceston to Latrobe would be £2.7.5., and the reduction is therefore a little more than 50 per cent., and a little better than the Main Line reduction. But the charge on these commodities between Launceston and Wynyard on the usual mileage basis would be £3.12.0, and the reduction will therefore amount to more than 66 per cent. over this distance.

25. The reason for the greater reductions is apparently that competition is somewhat keener along this line, which runs parallel to the coast and touches several ports with steamer services both with Melbourne and each other. This is not the case with the Main Line. There are steamer services between Hobart and Melbourne and Launceston and Melbourne, but not between Hobart and Launceston.

26. One further point has to be noted. Latrobe although an important centre, is not a port. It is,

however, within 7 miles of Devonport with good shipping facilities, and probably the reduction has been extended there on account of the fact that the distance is not too great for motor competition from the port.

27. There is also a special rate between Launceston and Hobart for cargo discharged from steamers from the Mainland or the United Kingdom, amounting to £1.13.6 on all goods except furniture. This is a reduction on all rates above Class E, and a very considerable reduction on goods coming within Classes 2 and 3. For the lower classes the usual rate presumably applies, but they are not likely to come from overseas.

28. Shipping competition, then, has a very definite effect on rates, and is the most serious competitive factor as far as Australia is concerned. It certainly is a serious factor in regard to Tasmania, whose trunk lines more or less have to follow the coast on account of the Central Plateau. These trunk lines are moreover the chief revenue earners, as a great many of the branch lines are not paying in any case. The bulk of the traffic becomes merely traffic to and from the nearest port, and with ports as plentifully distributed within easy reach of the chief producing areas as those of Tasmania, this means very short hauls.

(e) Road Competition.

29. The fact that Tasmania has this great amount of short haul traffic becomes important in considering the next type of competition, namely competition with road transport. With the development of the motor vehicle this is becoming a more serious factor in railway management. It is not peculiar to Tasmania, nor to Australia; it is a

world wide problem. This is clearly demonstrated by the fact that most British Trade Commissioners in foreign countries in their reports last year commented on road competition with railways in the country in which each is stationed. (11) The problem is getting so serious in many countries that active steps have had to be taken to combat it by means of restrictions of various kinds. Great Britain and America have also had to wrestle with the problem, and it is now facing all the Australian States.

30. It is one of the problems of transition that periodically face the world. It faced the ship-builder and ship-owner when iron ships replaced wooden, and again when these were displaced by steel, and when sailing ships were displaced by steam. It occurred in land transport when the railway displaced the stage coach. But in these instances the problem was not a serious one; the forms of transport displaced were of a type that allowed the working of small units, and the capital loss was not great. In this instance the threatened industry is a large scale industry which cannot, at any rate at present, be done without.

31. If the motor traffic were more economical than the railway, we should have to scrap our railways and concentrate on the building of better roads, but this does not seem to be the case. Wherever motor competition has entered it has taken the cream of the traffic, leaving the lower grade traffic to the railways. (12)

32. In some of the Australian States the motor traffic is confined almost entirely to passengers, in others the motors are also capturing some of the higher grade freight traffic. This obviously destroys the whole basis on which railway rates are based, namely the principle of charging what the traffic will bear. The railways are

able to carry some goods at low rates, not because the service costs less, but because they are able to get a much higher rate for other goods. This traffic charged high rates bear a large proportion of railway overhead costs, and if it is taken by competitors which do not take an equal proportion of the lower grades of traffic, the railways must charge higher rates on the traffic which remains in their hands in order to recover all their costs.

33. This is the factor which makes motor competition serious; it is not otherwise of sufficient extent to cause concern. It is difficult to realise what it really means without resorting to figures. In Tasmania the average haul per ton of goods is about 44 miles, and four classes of goods pay from 5s. 2d. to 7s. 11d. on this distance, one class pays 15s. 7d., and four pay from 22s. to 33s. 8d. If motor competition takes away the four most remunerative classes, it will cause far more serious inroads on railway revenue than if it catered for goods of all classes. And this is what motor competition is doing at present.

34. The case is even more glaring in the case of the passenger traffic. This is "high grade" traffic, which pays more than its share of overhead costs. Passengers in Tasmania as in the other States are carried in two classes, second class rates being considerably cheaper than first class. No one imagines that it costs very much more to carry first class passengers than to carry second class. Some people travel second class because they cannot afford to pay more, and the railway would therefore lose their custom. In return they are asked to put up with a little more discomfort, but that does not make the cost of the service much cheaper. The difference is there not because of cost, but in order to induce those who can pay to do so, and if the difference did not exist,

the railways would not collect the higher fare. Here again is the principle of charging what the traffic will bear, and again the motor traffic is only skimming the cream off the traffic. Motor vehicles seldom try to compete for the second class traffic; motor fares are usually fixed just a little below first class, and if the railway wants the traffic it has to reduce its first class fares to the level of the fares charged by motor vehicles.

(f) A Victorian Investigation.

35. It is difficult to get anything like an accurate measure of the extent of motor competition with Australian railways. The Victorian Railways have, however, made an attempt to show how far motor competition has taken passenger traffic from the railways. The estimate is based on the assumption that the travel habit of the people of Victoria has not altered since 1920 as regards country travel, and 1923 as regards suburban; that is, that as many journeys are made now per head of population as in those years. (13)

36. This assumption seems fair, as it is only reasonable to suppose that with better travel facilities more journeys per head are likely to be made now than previously. At the same time, it must be remembered that part of the better facilities are made by road transport and not by railways. The reasons for using the two base years for the two kinds of traffic is that for country traffic 1920 was the peak year, that is, there had been a steady increase in passenger traffic to that time. Since then there has been a steady decline. How far it is fair to take the peak year cannot be said from the figures presented, as they do not go far enough back to show whether there is a cyclical movement. Suffice it

to say that 1920 was a boom year, and that there is a decline in passenger journeys in 1921 and 1922 during the slump, with a recovery in 1923. But the decline is not great (about 4 per cent.) and one may therefore infer that the cyclical movement is not serious. Since then however, there has been a steady decline in country passenger journeys, which in 1927 stood at a figure fully 12 per cent. below 1920, despite the growth in population.

37. In the case of suburban travel, 1923 was taken as base, because by ~~that~~ year the electrification of the system, providing faster and more frequent services, had been completed. There was a rapid growth in passenger journeys up to that time, amounting to over 50 per cent. from 1919, but since then the increase has been only 2 per cent. It is therefore considered that the suburban travel habit had not been stabilised until that year, again a reasonable assumption.

38. On these assumptions it is estimated that the Victorian Railways lost revenue to the amount of £922,000 in 1927, £644,000 being loss in country traffic and £278,000 loss in suburban traffic. It is pointed out that during the same years the registration of motor vehicles went up enormously. In 1927 there were 120,000 motor vehicles registered as against only 22,000 in 1920; but it is not suggested that all the loss of traffic is due to motor traffic.

39. A further estimate is made of an allocation of the loss to competing factors. Portion of it is accounted for as due to new tramways (£83,000) and motor buses (£18,000) in the metropolitan area, and to country motor buses (£170,000). This accounts for a total of £271,000. Great care was taken to ascertain as closely as possible the extent of the motor bus traffic, which was

closely watched over a period. A full list of motor services is given in the statement with an estimate of the revenue each one of the 157 services is taking from the railways. There still remains £651,000 to be accounted for, and this is charged to the increasing use of private cars. No accurate estimate of this loss is possible; there is no sort of control of private car traffic, and therefore no means of getting reliable figures. But there can be no doubt that the private motor car is taking a great deal of traffic that previously went to the railways.

40. No attempt has been made in Tasmania to assess the damage done to railway revenue by motor traffic carrying passengers. But it is undoubtedly just as serious in this State as in the others. There are regular services competing with the Main Line and the Western Line along their whole lengths, and numerous other services in various parts of the State.

41. As far as freight traffic is concerned, the Victorian Railways Commissioners do not believe that any serious damage is done to their revenue. The traffic carried by commercial road motor carriers, which would otherwise be carried by the railways, is estimated at £24,000 per annum. In addition to this there is an unknown loss due to motor trucks owned by city wholesale distributors and by growers of primary products. This loss is likely to be the greater of the two, but there is obviously no way of ascertaining it.

42. In Tasmania the loss of goods traffic is far more serious, owing to the short distances. The road traffic cannot compete to any extent in the low grade traffic, but its increasing efficiency enables it to carry the higher grades of traffic over increasing distances. The

economies of road transport over short distances is easily seen. To be carried by railway, which seldom goes to the producer's door, goods have to be carted to the railway station, unloaded and loaded into trucks. At the destination, the same thing happens again. Road transport, on the other hand, loads up at the point of production and carries the goods without further handling to its destination, whether it be consigned to one person or a number.

43. The railway has the advantage of lower costs over long distances, because of being able to take larger loads in one unit, thereby saving labour costs, and by higher speed and lower fuel costs. On long hauls, therefore, it is difficult for the motor to compete, although it does compete over fairly long distances for the highly payable passenger traffic. The higher grade the traffic, the longer the distance over which road transport can compete.

(g) Effects on Rates.

44. What effect will this motor competition have on railway freights? The question must be answered from two points of view; from the point of view of immediate effects, and from the point of view of effects that will appear in the long run. The immediate effects are that the railways will have to lower the rates affected in order to meet the competition, and this is usually done where practicable. With one or two exceptions concrete instances cannot be quoted. So many fares and freights are constantly being altered without any reason being given that it is difficult to pick out those due to motor competition, which operates under constantly changing conditions. With shipping traffic it is easier, as this means port-to-port traffic, but even in the case of shipping it is so difficult if the railways choose to cloak it, that the British Rates Advisory

Committee has found it difficult to exercise a moderating influence on British railways in their rate wars against shipping. (14) It is much more difficult to trace the effects of motor competition on rates, because motor vehicles operate on constantly changing routes, and over constantly changing distances.

45. The passenger motor traffic between Hobart and Launceston has, however, grown to such dimensions that it is easily distinguishable. The distance is 133 miles, and the usual fare for this distance is 27s. 6d. Motor buses entered competition and lowered their fares from time to time until they reached £1. The railway had to fall into line, and reduced the first class fare to this figure. But the motors do not seriously enter traffic between intermediate points, although they might do so, were there a great discrepancy between charges. There was therefore no need for proportionate reduction to intermediate points, and the usual fares remained, with a maximum of £1. That maximum is reached at Conara Junction, 98 miles from Hobart, and the rate therefore becomes a "blanket" rate from there. Conara Junction is the starting point of a branch line to St. Mary's, but fares on this line are not affected, as competition does not enter here. The fare from Hobart to Fingal, which is just a couple of miles nearer Hobart than Launceston is, remains at 26s. 9d.

46. The best instance of Tasmanian freight rates affected by motor competition are the district rates in operation from Launceston along the Western Line to Dawson, a distance of 72 miles. The effect of this competition on rates will be seen in Graph C, which should be compared with Graph D, drawn to the same scale. It will be seen that all the rates run together, and horizontally, from 40 to 45 miles from Launceston. Deloraine is 45 miles from

Launceston by railway, but can be reached by an excellent road from Launceston in 30 miles. This road does not touch the railway line between 10 and 40 miles from Launceston, going by a shorter route. It is at Deloraine, therefore, that the competition is most keenly felt. From there onwards competition is naturally not so keen, as it is more difficult for road transport, to compete at such distances. The rate for Class 3 goods is half the usual mileage rate to Deloraine, but to Dawson the rate in the same class is roughly two-thirds of the ordinary mileage rate.

47. The immediate effect of motor competition is therefore that fares and freights will be reduced between the points competition enters for the classes of goods affected. But as road transport is not nearly as efficient as railway transport, except on very short distances, it can only compete for the traffic which pays high rates on the railway. Motor traffic in its present form is not subject to joint costs to anything like the extent of the railway, and has therefore no object in carrying some goods at lower rates than others, except where competition compels it. And the competition between motor vehicles is not sufficient yet to induce commercial road carriers to bid for the lower grade traffic; they are able to pick the best traffic, and are extending over longer distances rather than to lower grade goods.

48. The ultimate effect of motor competition, as indeed of any extensive competition, will be to increase rates as a whole. It has been seen that railways will charge higher rates for some goods and on short distances, and that motor competition is taking both these classes of traffic. The high rates charged for the short distance

hauls do not mean much to the railways, as they consist to a large extent of terminal charges, and therefore contain a large element of direct cost involved in the service. The high charges for certain goods, on the other hand, involve a large proportion of overhead cost. As has been seen these goods have to bear a large proportion of overhead cost, to allow other goods to be carried more cheaply. But, if the motor traffic takes merely the goods carried at high rates, the railway is left with only the low grade traffic, which cannot pay much towards overhead costs.

49. Again Victoria may provide a good example. The Victorian Railways, like other railways, give concessions to country industries by carrying raw materials and coal at low rates. These goods would be carried at low rates in any case, but further special reductions are given to many country industries. The railways discovered that the manufacturers concerned took advantage of these low rates by getting raw materials by railway, but sent their finished goods, which had to pay high rates on the railways, by motor vehicles which could quote lower rates on account of the fact that they only carried this high grade traffic. The Railway Commissioners pointed out that it was only the fact that they counted on getting the high grade traffic that made it possible for the railways to quote the low freights for raw materials, and thereby succeeded in getting back some of the traffic in finished goods.

50. There are therefore two distinct reasons why road competition must in the long run tend to increase railway rates as a whole. The first is that road competition, like any other competition militates against the fullest use of the railways. The lessening of traffic will mean that there will be some unused productive capacity, and unused productive capacity is uneconomic.

51. The second reason, which is peculiar to motor traffic, is that it takes away the high grade traffic, bearing a high proportion of railway overhead costs, which will leave the railways with an increasing proportion of this overhead cost unprovided for. Either the railways have to lose money, or they must increase the rates on the traffic still left to them. In combatting competition they will have to reduce rates on the high grade goods affected, and in order to recoup themselves, they will have to charge higher rates than they now do on the lower grade goods.

52. Motor competition may therefore in time have an entirely new effect on railway rates, intending to smooth out differences in charges. The railways will be constantly trying to increase rates in the lower classes, because they are forced to lower them in the higher. There may be a further general increase, on account of unused carrying capacity, unless the quantity of goods to be carried increases as fast as the carrying capacity of the competition, and even so there will be a prevention of any reduction that the increase in traffic might have meant.

53. There is also a further point. The analogy between railways and the flax concern previously mentioned has yet to be drawn. Just as the flax industry had a product of no value at present, but of undoubted value in the future, so railways have to build facilities both for present and future use. No railways build facilities for present traffic only; railways are always built on the assumption that the very fact of the railway's presence will bring future traffic greater than the immediate traffic. This is more particularly the case with State railways and with railways in new countries, and is therefore doubly true of Australia. Railways are deliberately built for the development of new areas. The builders of the railways,

particularly if the builders be a government, are prepared to face a present loss in the hope of a future gain. If competitive forces appear and take away the future gain, there is no chance of the railway recouping itself for early losses, other than to push rates up as high as they will go; if the railway is already charging all that the traffic will bear, it must go on losing, but there is usually a little "slack" to take up.

(h) General Conclusions.

54. [Railway rate making is a complicated business, for which it is very difficult to lay down rules. One might sing of the reasons for railway rates as Humphrey Pump sings of the failure of English roads to run straight:-

"The road turned first towards the left,
 "Where Pinker's quarry made the cleft,
 "The path turned next towards the right,
 "Because the mastiff used to bite;
 "Then left, because of Slippery Height,
 "And then again towards the right -
 "We could not take the left, because
 "It would have been against the Laws".

Chapman's inquiry

Pump was at much the same disadvantage as the economist;
 (as I surmised and I am P. did.)
 he could not make a romance of it, because he happened to know the facts.

55. There are so many considerations involved in the making of railway rates, that it is impossible to enumerate them all. There are the two guiding principles for rates generally, that they must, taken together, cover the cost of services, but that must be varied according to what the traffic will bear. Apart from these, rates are varied for hundreds of reasons, the weight of various possible considerations changing from one railway system to another, and from one area within a railway system to another. The New South Wales Railway Department sets out the principal points taken into consideration in fixing freight rates as follows:-

1. Value of the commodity.
2. Whether in crude or manufactured state, and purpose for which it is to be used.
3. Whether the commodity will bring other traffic to the railways.
4. Whether the commodity will be sent in truck loads or smaller lots.
5. Whether the commodity is bulky in proportion to weight.
6. What competition the commodity itself, as well as the Railway Department, will have to meet.

These broadly cover the points at issue, but each of these heads could be divided into an infinite number of sub-heads. On the face of it, railway rates appear to consist of a heterogeneous mass of arbitrary charges, totally inconsistent and grossly discriminating. But on examination it is soon found that each rate has found its level for very definite reasons, and must remain at that level until other and weightier reasons force an alteration. For railway rates do not remain constant for any length of time. No sooner has a rate book appeared, than alterations begin to be made, and in a very short time, usually less than a year, the alterations have so multiplied, that another book has to be printed.

continue article p 26

57. But although there are reasons for all rates, the reasons may not necessarily be actuated by the motives of public welfare. Private railways seek their own welfare before that of the public, and the general experience of countries in which the railways are not operated by the State is that some sort of control must be exercised by the State to see that railways are not sacrificing the public welfare to their own ends. Railway managers are only human, and it is natural that they should seek the highest possible revenue without inquiring too fully into the effects of their policy on the community. To some extent the interests of the railway are bound up with

those of the community, but American experience has shown that the two do not always run on parallel lines. It is ^{hardly} inconceivable, for instance, that a Government Department should pick out one man among a number of competitors and offer him special rates to help him outbid all others. Yet this is done by private railways in any number of instances.

58. This is one distinct advantage that State railways offer a community. Discriminations have to be made, but they are made justly and openly, and it is open to anyone engaged in a particular trade to take advantage of them. With government regulation of private railways this is achieved to a degree, but there are numbers of ways in which a railway company may discriminate between persons, and still be within the law. Ripley (15) gives a whole catalogue of the ways in which American railways circumnavigate the Law and the decisions of the Interstate Commerce Commission.

59. The general principles underlying the making of railway rates were summarised at the end of the previous section, and some of the outstanding effects of competition on rates, dealt with in this section, may now be summarised:-

1. If two railways are in competition at certain points, the shortest line between the two points must set the rates, and the longer must come down to them in order to secure some of the traffic. But the shorter railway must not be allowed to charge lower rates to the competing point than to intermediate points, which is uneconomical.
2. Competing railways may not necessarily be parallel; they may run in opposite directions. Thus the Victorian and New South Wales railways are competing for the traffic to and from the Riverina district, which lies approximately half way between Melbourne and Sydney. The New South Wales railways, by being in a position to fix part of the rates from Melbourne, has a distinct advantage, in that they can make rates from Sydney cheaper than rates from Melbourne.

3. Water transport is the most serious competitor with the railways on account of its inherent cheapness. Water competition is felt in all Australian States, but is most serious in Tasmania, whose chief railways connect ports at no great distance from each other. But shipping competition between Tasmanian ports is not as serious as shipping competition from Melbourne, which tends to make this city the distributing centre for Northern Tasmania in preference to Hobart. The effect on Tasmanian railways has been a lowering of rates between ports, of which several examples are given.
4. Motor competition now presents another serious problem to Australian railways. Motor competition presents two peculiarities, one is that it takes the most payable traffic, leaving the railways with the traffic that cannot pay its full share of overhead costs. The reason is that road transport has not the same large proportion of overhead costs as the railways, and can therefore charge a flat rate for all goods. The other peculiarity is that it is as yet effective only over comparatively short distances, and must leave long distance hauls to the railways. Its great danger is therefore that it destroys the whole basis of railway rates.
5. An investigation in Victoria shows that in that State the competition is most serious in regard to passenger traffic, and that the loss of goods traffic is insignificant. In Tasmania, however, the loss of both classes of traffic is serious owing to the much shorter distances.
6. The immediate effects of motor competition on railway rates is shown in a lowering of freight charges where competition enters. As instances are given the cases of passenger fares between Hobart and Launceston and freight rates between Launceston and Dawsons. In the latter case the competition is particularly severe because the road is shorter than the railway.
7. The ultimate effects of road competition must be to increase rates as a whole for two reasons. Firstly, road competition, like all other competition, militates against the fullest use of the railways. It will lead to an increasing amount of unused productive capacity, which is uneconomic. Secondly, motor competition is taking the most remunerative traffic. It will lead to an increase in rates, but as the higher grade rates cannot be increased, the increases must come in the rates of lower grade goods, making for a tendency to smooth out the differences between the various classes of goods.

IX. RATES AND RAILWAY FINANCE.

(a) Developmental Railways.

1. There yet remains one aspect of railway rates to be dealt with, which is of peculiar importance to Australia. This is the question of how far State railways ought to be made to pay for themselves without resort to taxation, and how far it is at all possible to make Australian, and in particular Tasmanian, railways pay their way. Should railway users be made to pay the full cost of the services rendered, or should the community help to foot the bill? It is a difficult question to answer. If, as Brigden and Giblin contend, the whole of the £5.2 mill. deficits incurred last year are to be regarded as subsidies to production, then they ought to be wiped out, but they may contain other elements than pure subsidies to production. It may be well to begin by clearing up this point.

2. It is a difficult question to answer, but one important point must first be cleared up. Mention has been made of the fact that a great many Australian railways are developmental railways, that are expected to get traffic some time in the future, which does not at present exist. The cost of running these lines, which cannot possibly pay for themselves, is obviously not part of the cost of the services on other lines, and it is hardly fair to ask the users of other lines to meet them. If the community thinks that by attracting additional population it will increase its prosperity and lessen the burden of future taxation, then it ought to be prepared to shoulder the burden, and not charge it to railway users. In Victoria this is actually done. The Government reimburses the railways for losses on new lines for ten years from their completion.

3. Nor is this all. Having built developmental railways the country may find that for unforeseen reasons or through lack of proper enquiry into the potentialities of a new district the developmental scheme, and with it the railway, is a failure. Unfortunately this does happen, and has been far too frequent an occurrence in Tasmania. It is, in fact, one disadvantage of government railway construction not properly supervised; lines are built for political reasons with a minimum enquiry into their future possibilities, which very often are taken for granted. Can this be legitimately charged to the costs of the railway system as a whole, and should rates be raised on other lines to pay the loss? Again the answer must be that the community, having made the mistake, must be prepared to pay for it. The general experience is that railway users cannot be made to pay for it, and that railway systems with either of these two handicaps refuse to pay for themselves. Rates have the definite limit of what the traffic will bear, and traffic will not as a rule bear such additions to cost.

4. While the matter for this reason more or less adjusts itself, there are definite reasons why it should be more closely attended to. The first is that a certain odium attaches to railway managements, because they fail to make the railways pay. Discouragement is bound to follow expectation to do the impossible, and railway managements in Australia are in most instances asked to do the impossible for these reasons. This is certainly the case where Tasmania is concerned, and, applies in varying degrees to the railways of most of the other States.

5. Secondly, there can be no intelligent attempt to make railway users meet the cost of the service, if

these costs are not known. And they cannot be known while they are mixed up with costs that are not attributable to the services performed. This is an even stronger argument for segregating expenditure of the class alluded to, particularly when it is definitely known that railway users cannot, for quite different reasons, possibly be expected to pay. These reasons may include competition between the railway and other forms of transport, competition with rival producers elsewhere, which preclude the payment of higher freight rates, or a number of other considerations.

6. It is therefore difficult to see how the whole of Australian railway deficits can be considered subsidies to production. They are partly subsidies to potential production, partly payments for mistaken policy, and partly, no doubt, subsidies to present production. In so far as they belong to the latter category they are difficult to justify. It is no doubt convenient from the State's point of view to subsidise production in this manner, but it would be far more satisfactory from the railways' point of view, were some different means found of giving subsidies to producers.

(b) Subsidies to Production.

7. In speaking of subsidies to production one can only make a general statement; it is difficult, if not impossible, to point out individual rates that involve a subsidy. It is even difficult to say what a subsidy amounts to. If a railway carries goods at rates which do not cover the direct costs of the service, or do no more, and the goods therefore pay nothing towards overhead costs, the rates clearly involve a subsidy. But a subsidy may be involved without the case being as clear as this. Can it, for instance, be said that the American

transcontinental railways, in putting Californian fruit on the market in competition with Southern fruit, subsidised the Californian growers? The fruit must have paid more than the direct costs of handling it, otherwise the railways would not have handled it. But it paid lower rates than those generally recognised as fair for fruit, and it is questionable whether some part of the difference must not be regarded as a subsidy.

8. A more clear case is presented by the rates on Tasmanian beer in Tasmania, dealt with in Paragraphs 18 - 21 of Section VIII. Before 1927 this commodity paid the higher rates still paid by "foreign" beer, and as the railways got the traffic, the industry must have been capable of bearing them. It must be kept in mind that the only criteria of fair rates are the direct costs of the service and "what the traffic will bear", the former setting the economic minimum and the latter the maximum. But as the railways have to carry large quantities of goods which cannot pay their full share of overhead costs, it is essential that goods should bear as high a rate as can be imposed without the traffic being lost. When lower rates than the traffic can bear are allowed, a subsidy is surely involved. It is, of course, difficult to point out cases in which this does occur, but it seems to be the case with the low rates on Tasmanian beer. The motive in this case was to aid the local producer rather than to increase revenue from the traffic; it is questionable whether revenue could be increased by it. First of all, there was a great deal of traffic from the brewery already in existence, which did not feel the "foreign" competition. This traffic is now taken at a very much lower rate, involving a loss of revenue that previously existed. In addition there must be a loss

of revenue on Victorian beer which previously went to centres away from the seaboard, and which paid a higher rate. There is no reason to believe that Tasmanians have become more inebriate as a result of the new brew; traffic has merely been deflected. The new rates have not been in force long enough to allow statistical determination of the difference in revenue, but it has probably diminished rather than increased.

9. In any case the actual facts do not affect the argument very materially. The only difference is that if the facts are as stated the case may be argued inductively from experience; if not, it may be argued deductively by regarding the foregoing as a supposition. There is no doubt that cases of this type do exist in abundance in Australia, but they are difficult to identify. They cannot be got from reports or from rate books, and the real facts are so scattered on various files in railway head offices that even personal enquiries bear little fruit. The reason is that Australian railway departments have paid little attention to the theoretical side of rate fixing, which is only natural in view of the fact that present theory does not lead them far towards the solution of practical problems. But there is a little too much insistence on rate-making being merely a matter of trial and error.

(c) Definition of Subsidy.

10. Returning to the question of subsidies there can be little doubt but that the rates discussed involve a subsidy to local production, whether it pays all the direct costs or not. This would lead to the definition of a subsidy as revenue the owners of the railways are prepared to forego in order to foster an industry.

Such a definition would exclude the case of Californian fruit, which was carried only because it involved a gain to the railways concerned. Such subsidies would in fact be mainly confined to State railways, but one could conceive of circumstances in which a private railway would similarly foster an industry in the expectation of indirect gain from other sources.

11. There is yet another class of subsidies to be considered, namely that referred to by Brigden and Giblin in their memorandum on the Australian Tariff presented to the Royal Commission on the Constitution. They state (Section E, Paragraph 11):-

"Very large sums are paid annually by the
"general taxpayer.....for the assistance of
" primary industries by road construction and
"provision for railway transport below cost".

The expression "below cost" in this case obviously does not imply that the goods concerned are carried below the direct costs of handling; as stated elsewhere (Section VII, Paragraph 66, above) it implies that Australian railway rates in the aggregate fail to produce sufficient revenue to meet all costs, with the result that there are deficits which have to be made up from taxation. An attempt has been made to show that the whole of these deficits cannot be regarded as subsidies, but doubtless a substantial proportion of them must be regarded as such. Their theory is that the costs of Protection, or a substantial portion of them, are passed on to unprotected industries, mainly agricultural, inflating their costs to an extent which makes it impossible for them to pay the railways the full costs of their services.

12. But they merely infer that railway deficits in the aggregate imply that such subsidies exist; there

is no suggestion that any individual industry could be pointed to as receiving such subsidy. It is, indeed, impossible to single out instances. One could not say, for instance, that were it not for the costs imposed by the Tariff Victorian wheat could afford to pay Class M rates (see Graph B.) instead of the present, for the simple reason that there is no standard of comparison. Rates on wheat in Australia may be different from American or Canadian rates for any number of other reasons. Yet these subsidies to unprotected industries are there, and are really not very different from the subsidy to Tasmanian breweries; the national policy of protection imposes costs, and these costs are in part met by subsidies in the form of lower railway freights. The definition of a subsidy given in Paragraph 10 will therefore still stand, although it may be argued that they go in the last resort to the protected industries. These, by being able to charge higher prices, impose costs on unprotected industries, which the latter cannot meet, and which are therefore met by taxation and disbursed, not directly as bounties, but indirectly in the form of freights low enough to cause railway deficits. The fact that the Commonwealth Government imposes the protective policy while the States pay the costs makes no difference. The taxpayers of the States are the makers of the Commonwealth policy.

13. To ask the railways to subsidise production to the extent of making a loss, which has to be recouped from consolidated revenue may be convenient, but is certainly not to be regarded as sound public finance. If the people of a State are to be asked to subsidise certain classes of production, they should be told what the subsidy is for and its cost. By cloaking it as railway expenditure there are no means of getting to know the facts.

14. There is also another matter, dealt with in more detail elsewhere, which must be attended to before Tasmanian railways can put rate-fixing on anything like a proper basis. That is the capital position arising from the fact that maintenance has not been provided to the extent it should be, and that only £105,500 has been provided for depreciation during the whole of their existence. The capital, and with it the interest bill, is hence inflated to an extent which makes it impossible to ask railway users to foot the whole bill. This may, in fact, be regarded as the accumulated effects of the factors mentioned above over a number of years. Only a part of the deficits due to those factors have been met as they have arisen, and the rest has been allowed to accumulate, with the result that the position is getting gradually worse.

(d) Summary.

15. The contents of this section may now be summarised:-

1. Railway freight and passenger rates should normally be so fixed as to return a revenue sufficient to cover all expenditure, including interest on capital. Australian railways (with the exception of the railways of Western Australia) are not able to do this, and in 1926/27 fell short by about £5.2 mill.
2. The causes of this deficit are three:-
 - (a) The building of developmental railways, which cannot be expected to pay for themselves for some years;
 - (b) Clear errors in construction;
 - (c) Subsidies to production.
3. The first involves expenditure which all railways must from time to time undertake; but private railways will usually undertake it cautiously, while State railways are bound to develop much farther ahead of production. In Australia an aggressive developmental policy has made the cost to the railways higher than in most countries. The practice followed by Victoria of subsidising developmental lines for a number of years from taxation seems the soundest policy.

4. The second cause of deficits is due to excessive optimism concerning the potentialities of new settlements in many cases, but may, as pointed out in Section 111. in some cases be due to totally unforeseen causes. Some such mistakes in construction must be expected, and may be regarded as part of the costs of railway development to be paid for by railway users, but when they become excessive, as in Tasmania, it becomes impossible to push rates high enough to cover them.
5. It is difficult to say what a subsidy amounts to, but if a railway carries goods at rates which make no contribution to overhead costs, the rates must be said to involve a subsidy. But rates that are higher than this may also involve a subsidy, which may be defined as revenue the railways are prepared to forego to foster an industry. If lower rates mean a net increase in revenue owing to heavier traffic they cannot be said to involve a subsidy, but if net revenue from the traffic decreases, the decrease must be regarded as such. The case of differential rates on Tasmanian beer is quoted to illustrate the principle, and in this case there is the added evidence of motive in its support.
6. But the case is not always as clear as this, and when Australian railway deficits are spoken of as subsidies to production it is impossible to point out the industries receiving these subsidies. Nevertheless they are real, and can be brought under the definition given above.
7. This policy may be convenient, but is not sound public finance. If taxpayers are required to subsidise certain industries, they should be told the reason and the cost, and by cloaking the subsidies as railway deficits there are no means of checking either.
8. In addition to the effects of these factors from year to year must be taken their accumulated effects, arising from the fact that capital becomes inflated by not making sufficient provision for maintenance and depreciation of assets. This will always occur on railways (as in other industries) where revenue is insufficient to meet all necessary expenditure. The effects in Tasmania are somewhat worse than in the other States, owing to larger annual deficits, and will be dealt with in more detail in another section.

X. THE FINANCIAL POSITION OF TASMANIAN RAILWAYS.

(a) The Accumulated Deficit.

1. The Tasmanian Government Railways have always been in a bad financial position, and have never been able to pay interest on capital. There are few Australian railways which have not at some time succeeded in accomplishing that feat, and no other railway system has failed by as much in the aggregate as the Tasmanian. The aggregate loss on the Tasmanian Government Railways from their inception to June 30th, 1927 was £4.95 mill. The only other two States which publish their accumulated deficits are Western Australia, where it is negligible, and South Australia, where it amounted to £7 mill. including accumulated depreciation charges. Excluding these the South Australian figure stood at £3.98 mill.

2. Sir Lennon Raws in a recent article (1) gave particulars of the accumulated deficits of all the States, but in all cases, except those mentioned, the figures are not complete. They are, however, of interest, and are given in Appendix X11. It will be seen from the Table that Queensland has the worst deficit, totalling nearly £24 mill. since 1887. By themselves these figures do not mean much, but their significance is readily seen when they are related to the capital cost of the railways concerned. The total capital expenditure of Tasmania to the date mentioned was £6.48 mill; in South Australia £28.73 mill; and in Queensland £60.16 mill. The Tasmanian deficit was therefore 70.4 per cent. of capital, the Queensland deficit 39.8 per cent., while the South Australian (including the accumulated depreciation), was only 24.4 per cent. of capital. Relating the deficits to gross revenue, Tasmania is shown in a still worse

position. The deficit in Tasmania is equal to the gross earnings of the railways for the last nine years, that of Queensland is equal to the revenue of the last three and a half, and that of South Australia is less than the revenue of one year and nine months.

3. But the figures are not strictly comparable, even on this basis. The South Australian deficit includes an accumulation of depreciation charges amounting to more than £2 mill., and if this is excluded the deficit would be only 13.9 per cent. of capital, even then the deficit would include some depreciation written off in previous years. In Tasmania, on the other hand, practically no depreciation has been allowed, and depreciation at the rate of $1\frac{1}{2}$ per cent. since the inception of the railways would amount to something like another £3 mill., making the total deficit roughly £8 mill., or about 123 per cent. of capital. An endeavour will be made to show later in this section that the Tasmanian railways have surplus capital to at least this amount, which should have been written off.

4. Since 1887 the Tasmanian railways have paid an average return on capital of 1.45 per cent. The best period was the five years from 1912 to 1916, when an average of 2.24 per cent. was reached, and apart from the early years (prior to 1895) no period has been worse than that of the last six years, for which the average return on capital has been 0.64 per cent. On account of their first provision for depreciation the railways in 1926/27 had their first actual deficit on working, but leaving that out of consideration, the return amounted to 0.63 per cent. on capital, which is very close to the average for the last six years. Last year, however, the same provision for depreciation caused a larger deficit on

working, and leaving the depreciation charge out of consideration the return on capital amounted to only 0.52 per cent. The return on capital exclusive of depreciation charges is quoted here only to make the figures comparable with those of other years; for practical purposes the depreciation charges must of course be taken into account.

5. Still more disquieting is the fact that traffic appears to have actually receded slightly during the last five years. The total train-mileage in 1926/27 was about 8 per cent. less than in 1922/23. This is, however, not a perfectly reliable index, as less train mileage may simply be due to an attempt to cut working expenses by running fewer trains, and other figures show that this apparently had been done. But passenger traffic shows a distinct falling off. There was a gradual increase up to 1923/24, when the number of passengers carried had reached nearly 3 mill., and since then there has been a steady decline to 2.3 mill. in 1926/27. The report for last year, which has just been published, shows that the decline has been arrested, but figures are still a few thousands less than in the previous year. This decline is partly due to the severe depression which Tasmania had passed through, but partly also to the inroads of motor traffic, which has grown greatly during the last few years. The goods tonnage shows no easily discernable trend. There was a substantial increase in 1923/24 over the previous year, but a decline in the two following years, then another rise, with a slight decline again last year, bringing the total back to what it was in 1923/24. There has, therefore, been no increase in goods traffic to compensate for the loss in passenger traffic.

6. There appears to be no question of mismanagement or extravagance on the part of the administration. Railways commissioners have pruned down the staff from time to time, and Royal Commissions have wielded the economy axe with the fixed idea so common among them that retrenchment in expenditure must mean economy. There are, however, a number of other problems facing the Tasmanian railways, three of which may be briefly dealt with. One is that of over-capitalisation owing to the lack of provision for depreciation and renewals, a second the question of what is to be done with branch lines which do not appear likely ever to pay working expenses, and a third that of motor competition. The aim of this section is to deal with the first two of these.

(b) Private and State Railway Capital.

7. It was explained in Section 111. that railway capital once invested is almost irretrievably lost, if the construction of the railway proves to be an error. If the railway cannot be made to pay, the capital cannot be taken out and used elsewhere. The rolling stock might be used on some other railway, and a small sum might be realised by taking up sound rails and sleepers and disposing of them; but the main part of railway capital is sunk into the making of the permanent way, and this cannot be retrieved. Even the land the railways is built on is practically useless for other purposes.

8. Railways are, of course, not often closed. It is seldom that such a bad error is made in construction that the railway cannot pay working expenses, even if it does not pay much of a return on capital. And once it does manage to pay working expenses there is no object

in closing it. A State railway may suffer a big loss without closing, but even a railway constructed as an ordinary business undertaking must continue as long as it can recoup working expenses, otherwise the capital invested is lost for ever. There seems to be no other reason for the continued existence of the Emu Bay Railway in Western Tasmania which has not paid one dividend in the whole 30 years of its existence.

9. But there is one vital difference between the actions of Governments and private investors in such circumstances. A private railway company would have no compunction about writing off capital that is definitely lost by means of a "reconstruction", while Governments will cling tenaciously to the fiction that lost capital still exists. This tendency is inherent, perhaps, in the financial structure of State enterprises. Were these financed from consolidated revenue, losses of capital might be more readily admitted, but they are usually financed by means of loans, and in the vast majority of cases there has been no provision made for the repayment of these loans. Interest payments, then, have to go on, and if that is so, why should the capital be wiped off?

10. To the private investor, the matter will have a different appearance. He receives no interest on his investment, and therefore fairly quickly comes to the conclusion that it does not exist, or that only some small part of it exists. Railway reconstructions involving reductions of capital values are therefore not uncommon. There are not as common examples in England as in America, but Sherrington (2) quotes the case of the London, Chatham and Dover Railway, in which the £100 shares were first reduced to Southern Railway "B" share with a nominal value of £30; this was at the time of the amalgamations in 1922,

and since then the Southern Railway has put forward proposals to further reduce them to a nominal value of \$13. These shares have received only one dividend in the whole of their history. They would therefore have a low market value, and there would be no opposition to their nominal reduction.

11. Railway failures have been rather common in America, which is quite natural in a young country with a vast railway development, and with a banking system which in the past has tended to encourage panics rather than avoid them. Ripley (3) divides the causes into a number of classes ranging from mere unreasoning optimism at one end through various degrees of culpability to speculation and fraud at the other. The two outstanding forces in his opinion are over-expansion and over-capitalisation. He lays a great deal of weight on this latter cause, which has made many a railway go to pieces despite good management.

12. He quotes a good example in the Rock Island Railroad, which was re-organised in 1880. This road had neither suffered from over-expansion nor from excessive competition; on the contrary, ways and means had from time to time to be sought to get rid of excessive earnings without arousing public hostility. Subsidiary lines were absorbed, and such an exchange of securities affected as to double the capital stock and appreciably to increase the funded obligations. The process was repeated in 1902, and by 1915 what Ripley characterises as "this fine property" was in a state of prostration.

13. When an American railway goes bankrupt, a receiver is appointed by a State or Federal Court to take over the management of the concern on behalf of those interested, which includes the public with its right to uninterrupted service. But receivership, although it may last for some time, is only a palliative, and does

not remedy the position. A re-organisation is therefore taken with the aim of removing the causes of financial embarrassment. This may amount to foreclosure by the creditors and the sale of the property to the highest bidder, or it may mean merely the substitution of a new set of securities for the old. In the 30 years from 1882 to 1911 no less than 587 American railway companies with an aggregate capital of £1,335 mill. went through receivership and re-organisation, but the numbers in recent years have been much smaller.

14. The mere formalities of receivership and re-organisation do not concern this discussion. What is important is that it is a common practice and that the net result is a writing down of capital to an extent which allows of fairly profitable working. But as far as State railways are concerned such re-organisation is not usual, simply because it is not apparent that anything may be gained by it. As practically every State railway system in Australia is over-capitalised, the Tasmanian system being in the worst position, the question of whether any gain may accrue is of importance.

(c) Advantages of Reductions of Capital.

15. A brief resume of the causes of over-capitalisation might be of advantage at this point. First of all Australian railways are over-capitalised, because they have not provided adequately for depreciation of their assets. The Tasmanian railways are in this instance, as in many others, one of the worst offenders, as only £105,500 has been provided in the whole of their history. The amount was admittedly inadequate even for the two years in which it was provided, being less than one per cent. per annum on capital.

16. What this leads to was demonstrated by a recent

Victorian transaction. The railways owned certain piers which figured in the balance sheet at £279,830, the initial cost. These were taken over by the Harbour Trust at present value, which was fixed at £173,604. The result was that the railways were left with an item of £106,226 on their capital account, for which there was no corresponding asset. There would be any number of cases of this nature in similar circumstances; the fact is only realised when there is such a sale of railway property, which does not often occur.

17. Secondly, the railways capital accounts are charged with the capital cost of assets that have disappeared for other reasons. An excellent example is that of the Bellerive-Sorell line of the Tasmanian railways, which was dismantled this year (1928). All that remains are some rails and sleepers that are practically valueless on account of their age, and a few cottages previously occupied by railway employees; yet the capital cost of the line, £113,446, has only been reduced to £93,446, which still remains charged to capital account, although there are practically no assets remaining.

18. Thirdly, the railways are charged with the full capital cost of lines which do not pay working expenses, and give no indication that they ever will. The Victorian Auditor-General in giving evidence before the Royal Commission recently complained of this being the case with the Victorian railways. But the problem is far more acute in Tasmania, where these lines constitute a far greater proportion of the total mileage, and where their chances of paying appear infinitely smaller.

19. Having these causes of over-capitalisation in mind, the arguments in favour of writing down may now be

proceeded with. The first is that in as far as it is due to bad book-keeping, and the lack of provision for depreciation can be called nothing else, the carrying forward of this large fictitious capital is merely the perpetuation of confusion in the nation's accounts:

20. Good public finance demands clear book-keeping methods, but unfortunately the easiest way, as far as politicians are concerned, is in many cases a judicious amount of confusion; that is, not enough confusion to prevent an appearance of clearness, and yet enough to prevent the asking of awkward questions. Thus indirect taxes are preferred to direct, so that the blame may be transferred from the taxing authority to the wicked profiteer. And Customs duties and railway deficits are preferred to bounties so that the inquisitive section of the public may have difficulties in proving the extent of the subsidies and their destination.

21. In the same manner railway administrations are reaping now what Governments of the past sowed. The omission of depreciation in railway accounts have had no other object than that of reducing the deficit for the time being. No government is anxious to exhibit incapability in administration, and a deficit in any public undertaking is usually interpreted as such. If a deficit is looming, means will be sought to diminish it, and an item as intangible in the public mind as depreciation falls a ready victim.

22. The result is obvious. It simply means that something is written to capital which ought to come out of revenue, and succeeding generations ~~which~~ are saddled with costs that the past ought to have met. To omit provision for depreciation is in no way different from funding a deficit. The funding of a deficit may be

justified in cases of extreme emergency, and the funding of Tasmanian deficits in recent years may be justified on this ground.

But to admit justification for the omission of depreciation from railway accounts would involve the admission that Tasmania was in dire straits financially even for the last 25 years before Federation, an admission which no patriotic Tasmanian will make.

23. Over-capitalisation from this cause is therefore a result of successive breaches of one of the most important rules in public finance; namely, that the expenditure of the year must be met from the revenue of the year. If this rule is broken confusion must enter the accounts.

One result in this case is that deadweight debt is mixed with productive debt; or rather that a large amount of deadweight debt is being regarded as capable of earning full interest, which is clearly impossible. Viewed in this way, the debt incurred by the construction of lines, which are so clearly incapable of ever paying that they must be regarded as results of errors of policy, may be put in the same category.

24. Dalton expresses the opinion, which must be regarded as sound, that deadweight debt should be distinguished from productive debt, and that if productive debt should become unproductive, it ought to be admitted as deadweight debt. It is important that the public should know exactly how its money is spent, and it has no means of knowing under such circumstances. For this reason alone, it would be advisable to arrive at a fair valuation of railway property and to write railway capital down to what in light of such a valuation would appear a reasonable figure.

(d) Effects on Management.

25. But there are also important effects on the

management of the railways. The recurring deficits have inevitably had the effect of suggesting to the public that the railways are suffering from extremely bad management. And the public is encouraged in that belief by occasional speeches in Parliament, which on the whole are fairly moderate, and speeches by political candidates at election time, which are not. Royal Commissions have only added to the belief by suggesting unimportant avenues for retrenchment in expenditure without touching the larger issues.

26. The psychological effect of this attitude on the administration cannot be over-estimated. It is the task of the management to give the public the maximum amount of service and at the same time make both ends meet. A management so discouraged as to look on the task as utterly impossible, is not likely to work with much enthusiasm. It might muster some energy to make the deficit smaller, were even this possible, but the combined effects of over-capitalisation and past deficits have a tendency to grow and get out of hand. The administration has therefore lost the stimulus of a definite object, which must be restored before any marked improvement in working is possible.

27. One of the most important effects, both as far as the management and the public are concerned, is the effect this impossible situation has on the fixing of rates. As has been shown cost of service, although it is not the determinant of individual rates, is an important criterion for rates in the aggregate, in that it provides a minimum below which the total return from freights and fares must not fall. A knowledge of the cost of service is therefore an essential to good rate making.

28. The management of the Tasmanian railways has no

means of knowing the cost of service. If the cost is calculated on the annual expenditure of the railways, it becomes so high that it is more than the traffic will bear, which necessarily must be the upper limit. When what ought to be the criterion for a lower limit becomes higher than what must be the upper limit, there will naturally be a tendency for rates to stick around the upper limit, and in some cases to exceed it. When the latter happens, it must drive traffic to competitive services, where these exist. Where they do not, it may drive the industries concerned out of business.

29. There will be an ever present danger of this happening. Rate making is in any case largely a matter of trial and error. In order to attract business, railways will make their rates as low as possible, consistent with cost. Prosperous railways will always have the advantage of a bigger spread of overhead costs, and can afford to let some rates go down to very little above the "prime" costs of the service. Railways with chronic deficits will inevitably look only for business that can afford to pay a fair share of overhead costs, concluding that other business is not worth having. This tendency would not be so strong, were overhead costs easily ascertainable, but they are not, and the administration faced with a certain deficit is almost bound to overestimate the direct charges to be allocated to a particular service.

30. The tendency is therefore probably for Tasmanian rates on the whole to be higher than they ought to be, and for the railways to lose traffic they might get if their calculation of cost were on a better basis. There are two results: Railways users may be charged too highly for the services of the railway, and potential railway

users are driven to look to competitive services. It is the business of the railways to endeavour to underbid such possible competitors, but with such a high cost of service the railways are seriously handicapped.

31. This should be a substantial case for the writing down of Tasmanian railway capital to a reasonable figure. Having determined this question, the next is: what method should be used to determine a reasonable figure. The Victorian Railways are subject, in a ^{much}/smaller degree, to over-capitalisation, and two methods of arriving at its extent were suggested to the recent Royal Commission. One was the method which in practice determines the price of shares, namely to arrive at a capital figure that will earn the standard rate of interest and the other the method of revaluation. As one may be made complimentary to the other, both will be examined.

(e) The Standard Rate Measure.

32. The method of ascertaining the amount of capital on which the Victorian Railways could be expected to pay all interest charges was adopted by the Auditor-General of Victoria, Mr. Norris, in his evidence before the Commission. He pointed out that the face value of bonds and stock allocated to the railways was £71,734,059, and the interest on this was £3,287,277, which was equivalent to an average rate of £4.12.11 per cent. The railways could not pay this, as after providing for working expenses, they had only £2,854,754 towards interest payments, which was equivalent to £4.0.8 per cent., the charges against consolidated revenue to make up the deficiency being 12s. 3d. per cent.

33. He did not, however, consider one year a

sufficient criterion, and taking the average for the last ten years, found that the average rate of interest had been £4.5.11 per cent., of which the railways had managed to pay only £3.16.5 per cent., leaving 9s.6d., per cent. to be met out of consolidated revenue. The deficiency for the ten years was therefore smaller, but this was caused by a smaller interest rate, and the fact is therefore of little value. What is of value is that the railways had paid only £3.16.5 per cent. on capital on the average. The interest rate increased from £3.16.5 per cent. in 1917-18 to £4.12.11 per cent. in 1926-27, and is still steadily increasing, since the Government has been floating loans in recent years at rates ranging from 5 to 5½ per cent. And this does not apply only to new capital expenditure, but to the renewal of old loans as they fall due.

34. It might be thought that as the contribution towards interest payments was higher in 1926-27 than on the average, the ability of the railways to pay higher interest grew with the interest rate. But this does not seem likely. That year was a particularly good one, and for the year ended June 30th last, the deficit was £553,709, against £47,540 in 1926-27. Furthermore, in 1926-27, an amount of £250,000 was allowed for depreciation, while nothing was allowed in 1927-28.

35. The Auditor-General was therefore probably correct in stating that the Victorian Railways in normal years can only earn sufficient to pay working expenses and provide £3.16.5 per cent. on present interest bearing capital. But the rate of interest actually paid on the capital was in 1926-27 actually £4.12.11 per cent., and rapidly rising towards £5 per cent. Thus he came to the

conclusion that the railways were over-capitalised, and proceeded to estimate the extent of over-capitalisation. Using averages for the last ten years, he arrived at the following figures:-

1. The average loan liability was roundly...£63 million
2. The average of the net earnings
(after paying working expenses)
was roundly £2.4 million.
3. The capital value of the net earnings
capitalised on a five per cent. basis
was roundly £48 million
4. The capital in excess of earning
capacity was, therefore £15 million.

36. He therefore advised that capital be written down by £15 mill., and that a sinking fund should be established from general revenue to liquidate this sum in 25 or 30 years. This would, he contended, put the railways on a sound footing, and in order to keep them on a sound footing he made certain other proposals concerning management. One of his provisions is important, namely that a depreciation reserve should be established by law, and that another reserve should also be established to equalise expenditure on maintenance, and to provide adequate maintenance in lean years.

37. The Tasmanian deficits, are of course, much greater than the Victorian. It was shown in Paragraph 4 above that the average return on capital was only 0.64 per cent. for the last six years. Taking an average of the last 10 years, a slightly better result is shown, the average return being 1.06 per cent. It would be only fair to go back ten years, as the last few years have constituted a period of almost unparalleled depression, and the return on capital during the decade prior to 1922 was very much higher, so that if one goes back 15 years,

one finds an average return on capital of 1.3 per cent. But, by doing so, the years in which motor competition was hardly felt are included, and it might be safer to say that the ten years' average is fair. As the average capital liability during these ten years was £5,835,926, one may say therefore that on the average earnings of the last ten years the Tasmanian railways are capable of earning roughly one per cent. on £5½ mill.

38. But the interest rate in 1926-27 was 4.4 per cent., slightly lower than the Victorian, which was 4.6 per cent., but rising at the same rate probably, and likely to reach 5 per cent. before long, but in order to arrive at a liberal estimate, it may be assumed that 4½ per cent. is a fair basis. The Tasmanian position may now be set out in the same way as the Victorian was set out by the Auditor-General:-

- | | | |
|----|---|-------------|
| 1. | The average loan liability was roundly... | £5,800,000 |
| 2. | The average net earnings (after paying working expenses) were roundly £58,000 and the capital value of these net earnings capitalised on a 4½ per cent. basis is roundly | £1,320,000 |
| 3. | The capital in excess on earning capacity on this basis is, therefore ... | £4,480,000. |

39. In arriving at this estimate no allowance has been made for depreciation. But it is important in this connection to keep in mind that providing adequate maintenance is provided, there should be small need for depreciation charges. The present need is due largely to lack of maintenance in the past. However, some greater provision for maintenance may be needed, but this may be counterbalanced by better revenue results; if not, this estimate is too high. The position looked at in this way seems appalling, and no doubt it is. It must be

remembered, however, that were the Tasmanian Government railways for sale as a going concern, this is probably the chief method by which a prospective buyer would arrive at the price he would be prepared to pay. He would probably check his figures by other methods, but he would be bound to keep his eye chiefly on the earning power of the assets he was purchasing. Some qualifications of this estimate will be made later, showing that earning power may be raised by other means to provide for a higher capital value. Meanwhile the other method of arriving at a fair capital value may be examined.

(f) The Valuation Method.

40. While the Victorian Auditor-General adopted the method just described in endeavouring to convince the Royal Commission that the Victorian Railways were over-capitalised, the Railways Commissioners arrived at substantially the same result by the method of valuation of the assets. The valuation was evidently fairly exhaustive, and the sums which it was considered ought to be written off, were set out in detail.

41. There was a large number of items, which need not be considered in detail, and therefore may be summarised as follows:-

1.	Lines closed for traffic and surveys for lines not constructed	£723,000
2.	Balance of capital cost of piers transferred to the Harbour Trust (see Paragraph 16 above)	£106,000
3.	Balance of capital cost of obsolete rolling stock now being written off, (£182,000), and depreciation of rolling stock not provided for (estimated)	£5,300,000
4.	Depreciation of permanent way, bridges, buildings, workshops and machinery, signalling, telegraph and telephone equipment, electrical equipment, etc.	£10,225,000
Total			£16,354,000

42. The figures arrived at in this manner correspond very closely to those of the Auditor-General. If the individual items of the valuation are taken, however, it seems to form a rather conservative estimate of over-capitalisation. It seems, for instance, that an item of £2.58 mill. appearing in the balance-sheet at June 30th, 1927, as "discounts and floating charges on loans" (4) ought to be written off. The estimate of depreciation of rolling stock is also admittedly conservative, although it amounts to writing down the capital value of rolling stock by 40 per cent. The individual items were calculated on the average life of units of rolling stock, and engines, for instance, were taken to have an average life of 30 years, although engineers usually contend that 20 to 25 years should be the normal life of an engine. There are, of course, Tasmanian engines which at that rate should have been written off 30 years ago, but are still running. Such practice is not economical, however; apart from obsolescence, the repair bills become larger with age. It may be assumed that the whole estimate is therefore rather conservative, and possibly the Commissioners aimed at a statement which could not be attacked on the score of rashness.

43. It is impossible to attempt a similar estimate of Tasmanian over-capitalisation; it must be done by railway experts. But a few observations may be made. The capital cost of the Sorell line (£113,500) ought to be written off, as the line no longer exists. There are also a number of other lines, which, although they have been in existence for years, have never paid working expenses, and are not likely to. The capital of these lines, amounting to nearly half a million pounds, should also be written off. What should be written off the

capital cost of the rest of the permanent way cannot be ascertained without a close investigation, but it would probably amount to a great deal more proportionally than what is estimated for the Victorian Railways.

44. That estimate amounts to roughly 17.5 per cent. of the capital cost. But the Victorian railways have been kept in much better order than the Tasmanian, owing partly to the higher speeds required, and partly to the greater prosperity of the Victorian system. As depreciation affects capital values, so maintenance expenditure will affect the amount of depreciation to be allowed. An asset will naturally depreciate more in value if it is not properly maintained. For this reason it is quite probably that the amount to be written off the cost of Tasmanian railways is double that of the Victorian estimate, when reckoned as a proportion of capital invested; i.e., more like 35 per cent. of capital than 17.5. There are numbers of assets which are practically worn out, such as the Hobart and Launceston stations, and the Bridgewater bridge.

45. The same applies to rolling stock. If, for instance, 30 years is a conservative estimate of the life of an engine, at least half of the locomotive stock ought to be completely written off, and most of the rest written down by more than 50 per cent. Of a total of 95 engines, only 17 have been purchased since 1912, most of them being purchased in 1922-23. But even of these six were second-hand, their ages not being stated. It is therefore quite likely that 60 per cent. or more of the locomotives stock ought to be written off. The same will probably apply to other rolling stock. Most of the carriage stock is antiquated, and would have been put out of action long ago on a more prosperous railway.

46. It must be understood that these estimates are little more than guesses, and that nothing short of a close valuation would reveal anything like an accurate figure. But a rough checking up of these estimates shows that on this method the capital would hardly be written down by more than one-half, leaving three to three and a half million pounds.

47. Thus on the method of valuation the Victorian estimate of superfluous capital becomes higher than by using the other method, while in Tasmania's case, the opposite happens. It is easy enough to account for this; the Victorian Railways form on the whole a far better business proposition than the Tasmanian Government Railways. This matter has been dealt with in Section 1. where an endeavour was made to show that Tasmania is over-supplied with railways in comparison with other States. This is another result of over-optimism in the past, and the excessive optimism might as well be admitted. That is in fact, all such a writing down of capital would mean.

(g) The Non-Paying Lines.

48. Apart from over-capitalisation the non-paying branch lines form the greatest obstacle to the profitable working of the Tasmanian Government Railways. Mention has been made of these in various other sections, but some further consideration of the problem they present is necessary. Particulars of the losses on these lines up to the year ended June 30th, 1912, are given in Appendix VI11, and it will be seen that these losses, compared with revenue, are fairly serious. Unfortunately, it was decided in that year that the work involved in keeping separate accounts for these lines was not justified, and it was discontinued. The Commissioner for Railways appears to have been quite justified in taking this step at the

time, as there was no question of closing them or of giving the railways assistance to defray working expenses.

49. An investigation has, however, been made lately into the cost of working on some of these lines. The Mechanical Transport Sub-Committee of the Commonwealth Development and Migration Commission is at present investigating the causes of losses on the Tasmanian Government Railways, and for its information the Railway Department investigated the working costs and revenue on five branch lines. The result of the investigation is shown in the following table:-

Branch Line.	Working Costs. £	Branch Line Revenue. £	Loss on Working. £
Sheffield Branch	3857	2121	1736
Nictta Branch	2167	1755	412
Chudleigh Branch	2919	1249	1670
Peolenna Branch	1629	1182	447
Apsley Branch	7172	2631	4541
Total	£17744	£8938	£8806

50. The loss on working on these branch lines was nearly as great as the revenue. Even this is, of course, no complete proof that the lines were not paying. There are branch lines in all parts of the world which do not pay, but are considered justified in that they bring traffic to the main lines in sufficient quantity to recoup their working loss and make some small contribution towards the overhead costs on these lines. But this was not the case with the five lines under review. The total revenue derived from them amounted to only £14,260, which means that they only brought traffic worth £5,322 to main lines. When main line working costs are deducted from this, the surplus will probably be too small to be considered worth while; but in any case, the amount of

traffic brought to the main lines is not as great as the loss incurred in the working cost of the branch lines.

51. In addition there are the capital costs of the lines to be considered. The capital invested in them amounts to £530,339. The average rate of interest payable at present is 4.4 per cent., and the share of these lines in the interest bill is, therefore, £23,340, which added to the £8,806 loss on working makes a total loss of £32,146.

52. Losses on branch lines in the early years of their working may easily be defended. Most of the Australian States have non-paying branch lines, but they are developmental lines, which may be expected to give an adequate return some time in the future. Agricultural development comes slowly, even when forced, and lines constructed for developmental purposes cannot be expected to pay for some time. Victoria has given definite recognition to this, in that the Victorian Railways are subsidised from Consolidated Revenue to the amount of the loss on new branch lines for ten years after they have been opened.

53. But these lines are in a different category. Two of them, the Chudleigh and Apsley lines, were constructed in the 'eighties, and have never shown any signs of paying their way. The position of the Apsley line was discussed in Section 111, Paragraphs 17 - 19. It runs along a good road the whole of its length, and the road has the advantage of going right to the settlement at Bothwell, whereas the line stops in the wilderness 10 miles away. The continuation of the line to Bothwell is unthinkable; the engineering difficulties would make the cost so high that it could not be expected to pay in any case.

Bothwell traffic, for which the road carriers of the 'nineties competed, must therefore continue to go by road, and the traffic along the line is not likely ever to grow sufficiently to justify its construction. While this is the worst offender, the other lines are much in the same position. The Chudleigh line is older than the Apsley line, but the other three branches are of much later construction. They have, however, shown no improvement since they were opened, and as far as can be seen they will never be much better off than they are. They are all short, and all subject to competition by road.

54. These are not all the non-paying branch lines. There is a number of other lines not doing very well, and the Department merely picked out the ones suspected of being the worst losers. No data are available for the others. The two West Coast lines are both losing, but how heavily there are at present no means of saying. In any case, these lines are essential and must be kept open. The Melrose line, going from the Don Junction near Devonport to Barrington is in a peculiar position. The first section of this line was constructed from the Don to Melrose to serve the Broken Hill Proprietary Company's limestone quarries in that district, and is apparently paying. But in 1922 an extension to Barrington was opened and the traffic on the extension has been infinitesimal. The section was therefore closed this year. Another line incapable of paying working expenses is the short Parattah-Oatlands line, only $4\frac{1}{2}$ miles long.

55. The five lines covered by the investigation are in no way different from the Sorell line, which was closed last year (1927), except in that the Sorell line was not in a position to bring traffic to other lines. With the knowledge that the traffic brought to other lines cannot

pay working expenses on the branch lines this difference is finally eliminated, and there seems to be no reason why they should not also be closed. No greater hardship can come to the people along these lines, who are all served by roads, and evidently use the roads as much as they do the railways.

56. The closing of branch lines which after investigation proved to be far short of paying working expenses, would relieve the railways of a great deal of expense, and somewhat modify the figure given in Paragraph 37 above of the capital sum on which they can pay interest. The £8,806 working loss on the five lines covered by the investigation, for instance, would pay interest on another £195,000, making the capital that can be supported on present earning up to £1,515,000, an increase of nearly 13 per cent. Further investigation may disclose other losses of the same nature, and even the losses on the lines mentioned may be greater than for the limited period covered by the investigation.

(h) Summary.

57. It is difficult to summarise in a few words the matters dealt with in this Section, but an attempt may be made:-

1. The Tasmanian Railways have always been in a bad financial position, and have never been able to pay full interest on capital. The aggregate loss to the end of 1927 was nearly £5 mill. or 76.4 per cent of the capital invested. Other States show greater aggregate deficits, but proportionally the Tasmanian is by far the worst. But even in proportion to capital the deficits of the various States are not comparable, since some include some provision for depreciation and others, including Tasmania, do not.
2. Since 1887 the Tasmanian railways have paid an average return on capital of 1.45 per cent. but the worst period has been the last six years, when the average return was only 0.64 per cent. In the last two years the railways have shown an actual deficit on working, on account of the provision for

depreciation. Traffic also appears to have receded slightly. There is no increase in goods traffic, and passenger traffic has actually diminished. The cause is partly due to depression, but partly also due to the inroads of motor traffic.

3. As railway capital is irretrievably lost once a railway closes, railways are not closed as long as they can pay working expenses. This applies to both State and private railways. But there is a vital difference between the actions of governments and private investors in such circumstances. If capital is not returning interest the private company will attempt to write it off, while Governments, having to pay interest in any case, will keep it on the books of the railways.
4. Most Australian State railways are over-capitalised, the Tasmanian being the worst offender. This is due to inadequate maintenance, little provision for depreciation, and errors in construction saddling the railways with lines that will never pay, and therefore represent lost capital.
5. The arguments for writing off capital that does not exist are:-
 - (a) In as far as it is due to bad book-keeping, the carrying forward of fictitious capital means merely the perpetuation of confusion in the nation's accounts; deadweight debt ought to be admitted as such.
 - (b) Recurring deficits have inevitably the effect of suggesting to the public that the railways are badly managed, causing discouragement to the management.
 - (c) Cost of service cannot be used as a criterion for the general level of rates, as the real cost is indeterminable.
6. There are two methods for determining the amount of over-capitalisation. One is to find the amount of capital on which the railway will pay the standard rate of interest, which is the usual method of valuation when a business is sold as a going concern. On this method the Tasmanian railways could not be valued at more than £1.32 mill. The other is a valuation of the assets of the railway. As this could only be undertaken by railway experts, no reliable estimate of capital on this basis is possible.
7. Apart from over-capitalisation the non-paying branch lines are the greatest obstacle to the profitable working of the Tasmanian railways. No separate accounts are kept for these, but a recent investigation shows that the working costs on five of the worst lines are far greater than the total revenue from them, including the revenue they bring to other lines. These lines are not in the category of non-paying developmental lines; they have all had a fair trial and have been proved incapable of earning working expenses. The closing of these lines would put the railways in a position to pay interest on nearly another £200,000.

X1. THE PROBLEM OF ROAD COMPETITION.

(a) The Extent of Motor Competition.

1. The problem arising from the competition of road transport with the railways has been briefly dealt with in Section VIII, but the problem is assuming such dimensions in recent years, that a fuller treatment seems necessary. Something may also be said of the remedies proposed for dealing with the problem in various countries.

2. It appears that the problem has reached far greater dimensions in most countries than in Australia. In America, 41 States out of 48 have resorted to regulation of the traffic, and in England it is just being dealt with. In that country the competition has now gone so far that the road motor services are providing sleeping cars for long distance travel between London and the industrial centres of the North. (1) In Germany, Austria, Holland, Sweden, Norway and Spain the road competition with the railways have assumed serious dimensions, according to the reports of British Trade Commissioners in these countries, and it appears that the two latter are the worst sufferers. Sherrington, (2) however, classes the Commonwealth with these two, as proof that State-owned railways have suffered more than privately-owned systems.

3. There can be no doubt that the problem is felt in Australia and that it is getting more serious year by year. The Railways Commissioners of all States make mention of the fact from time to time in their annual reports, and most of them have made some effort to cope with the problem. The two most successful so far seem to be South Australia and Victoria, but even they have not succeeded in overcoming the competition.

4. The competition seems to be most severe in the

passenger traffic. This has been the experience in both England and the United States. In evidence before the recent Committee on the Railway Road Transport Bill, two English railways estimated their combined passenger losses at 54 million, casual passengers, and 97,000 season tickets per year. The L.M.S. Railway estimated goods losses at 6 million tons, and the revenue loss at £2 million. (3) As mentioned earlier (Section VIII) the Victorian Railways considered the loss of goods traffic to be too small to worry about, but in most of the other States a rather more serious view is taken, and in Tasmania, owing to the short distances, it has become a very serious factor. But it does appear that road passenger services operate over longer distances than it is yet possible to operate freight services. Sherrington mentions the Boston-New York route of 233 miles as an American instance, but even Tasmania has a longer route than that. There is a daily service between Hobart and Launceston, 133 miles, and with that is linked another service from Launceston to Burnie, another 112 miles, making a total of 245 miles. The journey with these combined services takes a little longer than the train journey, owing to the break at Launceston, but the actual travelling time is no longer, and the journey can be accomplished in one day.

(b) The Economics of Road Transport.

5. What are the advantages of the motor car over the railway? In regard to the passenger competition it is the private car which is the most serious rival of the railways and it is difficult to see how this form of competition can be met by the railways. In this case it is the advantages of ownership of the means of transport, and power of going where one likes, without being tied to a schedule, that counts. And the private car does not only

carry its owner; it will usually carry others as well. A car owner going from Hobart to Launceston, for instance, will rather have company than go alone, and will therefore gladly take someone with him, whether the other person helps to defray the cost of the journey or not. The most serious rival of the railways in this respect is probably the country commercial traveller, who was once one of their best customers. He has usually fairly regular, or at any rate well known, days of call, and is only too glad to do country customers the service of taking them along the road. The possibilities of loss to the railways by these means may seem small, but they are regarded as quite serious by the Tasmanian administration. There is obviously little chance of ever meeting this kind of competition by anything short of its prohibition, which is unthinkable.

6. The motor-bus services are on a different footing, being operated to return a profit, but they have within certain limits advantages over the railway. One important factor is that they are operated in small units, having little in the way of overhead costs as compared with the railways. This is a great advantage where the buses are competing with railway branch lines, where traffic is comparatively small, and the railway finds it difficult to cut down its unit. In any case the road vehicle can take all its staff with it, and requires nothing in the way of station staff. The vehicle being usually operated by its owner, regulations as to working hours are of little concern. Even where a staff is employed this applies to some degree, in that there is no great trade union to enforce regulations with the same rigidity as in the case of railways. This was also brought out in the evidence on the English Railway Road Transport Bill. It was pointed out that although in England passenger motor

services are organised on a large scale, one group owning 11,000 vehicles, they were not subject to the strict regulations of the railways. This contention on the part of the railways, the road services made no attempt to answer.

7. There is the further advantage that the motor-bus is more mobile than the railway; that is, it has a greater choice of routes, particularly when it is operated in or near a great city. It may change its routes according to the changing conditions of traffic with greater ease than the railway. This is very noticeable in a city like Adelaide, where the extent of motor competition with both railways and tramways seems greater than in most Australian cities. The buses will ply their usual routes during the week, but on Saturdays they will leave these to run to racecourses and football grounds, and on Sundays they will run excursions to places outside the city. The latter is also a sore complaint with the Victorian Railways, who are prohibited from running Sunday trains in competition with the motor traffic. They contend, and quite justly, that either the railways should be allowed to run Sunday trains, or the motor-buses should be prohibited from running on Sundays, as the present conditions are conducive to giving the public a road-travelling habit.

8. The advantages enjoyed by motor freight services are not very different. The truck employed by the private firm to distribute its own goods is not in a different position, as far as the railways are concerned, to the private passenger car. But it does not operate over the same distances, although its radius is much greater than that of the horse-drawn vehicle, and is increasing with the increasing efficiency of the motor vehicle.

9. The commercial freight vehicle, like the commercial passenger bus, is on a somewhat different footing. But it also has the advantage of greater choice of routes; it has indeed this advantage even to a greater degree than the motor-bus. Whereas the motor-bus has to establish a time-table of some sort and stick to it, the freight vehicle may go from day to day where freight offers. There are, of course, in addition freight vehicles which operate on one route and more or less to a time table; but they may at any rate abandon the route and take "odd jobs" when it proves unremunerative, and this is not open to the railway.

10. Users of freight vehicles on a regular route find advantages in them arising from the fact that they are small-scale units. The motor-owner will do what the railway would find almost impossible; he will act as an agent of the customers as well as doing his carrying. To the small farmer and tradesman in the country this is a great advantage. The motor-owner will carry his goods, not to a central depot from where the buyer has to fetch it, but to his door, will collect his money, and perhaps even disburse it again by buying goods to carry back. He will also collect empties and carry them back to the customer's door. This is a great saving for the customers, who might otherwise have to make frequent trips himself, or do the business less satisfactorily by correspondence. This is something which the railway is unable to do, although the Victorian Railways have undertaken it in the case of Victorian country fruit growers with some measure of success, and the Tasmanian railways have followed their example. In a large trade of this type the railways may be successful, but it is impossible for them to deal with the everyday purchases and sales of small farmers and country tradesmen.

11. Another important advantage of road transport is

the smaller danger of breakages and pilfering of goods in transit. Claims for damage and loss are a constant source of annoyance to both shippers and railways, and are greatly diminished with motor transport. Pilfering is reduced because the cargo is under the control of the same person throughout the journey, and responsibility is therefore much more easily determined. Transshipments are eliminated, since the motor truck takes the goods from door to door, and the smaller amount of handling makes for a reduction of breakages. On this account it has been found in England that shippers of fragile goods are prepared to accept a slightly higher rate for road transport, saving the difference in the smaller risk of breakages and the less elaborate packing needed.

12. A further advantage lies in rapidity of road transport over short distances, and where traffic is light. The delays of the railway are nearly always terminal delays, and the importance of these diminish as the distance becomes longer. Waiting for a train is obviated by using road transport, which will leave at any time to suit the customer. It may mean a lot of difference in bringing milk and other perishable goods to market; time is saved and the goods arrive in better condition. This advantage is of course greater where traffic is light and trains on that account infrequent. A good concrete example is that of bringing Hobart newspapers into country districts. The morning newspaper is a breakfast food, and in these days of radio broadcasting news is almost as perishable as milk, even where there is no competing newspaper. But the first train does not leave Hobart until 8.50 a.m., and as the newspaper is published about 2 a.m., it can be 150 miles away by car before the train leaves.

(c) The Limits of Motor Competition.

13. But with all these advantages road traffic has its severe limitations, which have already been explained in Section VIII. Motor vehicles are not able to compete with the railways over long distances for any kind of goods, and can compete with them over short distances only for the classes of goods that pay high rates on the railway. The general opinion seems to be that road transport is at present limited to distances of 30 to 50 miles according to the traffic to be handled and other factors, such as the efficiency of railway services. Its greater efficiency over such short distances is due chiefly to the inherent disadvantages of the railway, which involve carting to and from railway stations, consequent handling at each terminal, and terminal delays.* With distance these are diminished. Motor transport has in effect the same advantages as horse-drawn vehicles, with the difference that horse traffic is limited to very much shorter distances.

14. The reason for differentiation between types of goods by railways has been shown to arise from the fact that the railways have a high proportion of overhead costs and will carry some goods at low rates so as to utilise capacity to the fullest extent, charging higher rates for goods that will bear them in order to make up the deficiency. Motor traffic is not subject to overhead costs to the same extent, although it has some. Fenelon (4) shows that these, which he calls "standing charges" are three times as heavy as running charges, but he includes in them wages, depreciation, and repair shop wages, which are by no means comparable to the "constant" expenditure of the railways. He admits that wages is a doubtful item, but depreciation must also vary considerably with mileage. At any rate, the importance of overhead costs

is much smaller than with the railways, and there is not the same justification for differentiation as with the railways. Here Taussig's statement of the justification for differentiation (5) is important. It lies in the fact that it allows a greater sum of services to the community, and is forced on the community as well as the railways by consideration of efficiency. Take away this opportunity of differentiating, or any part of it, and railway efficiency is impaired.

15. This is what motor traffic does. It is not able to outbid the railways for the lower grades of traffic, and can only go below the highest rates of the railways. For this reason it cannot be considered as efficient as the railways are. The Victorian Parliamentary Standing Committee on Railways puts it this way:- (6)

"It is an easy matter for a road carrier charging, as is customary, a uniform rate per ton on almost all kinds of commodities, to pick the eyes, as it were, out of the railway classification, which classifies goods at rates varying from, say, 5s. for road metal, to £5 for silk or tobacco between the same stations. The effect of this principle, is, that the railways are handicapped by carriers, quoting an intermediate rate of, say, £3 which catches all the railway commodities rated above £3, and railways are left with the low-grade, 'unpayable, goods'.

16. This is in itself fairly conclusive proof of the greater efficiency of the railways. A case was quoted earlier of Victorian country manufacturers giving their traffic in finished goods to road carriers, while their raw materials, on which only low rates are possible, had still to be sent by rail. Victoria is not the only State suffering in this manner; it has in fact got further than any other State in combatting road competition. Similar complaints may be found in the report of the other State railways. The Queensland and Western Australian Annual Reports for 1927, for instance, put the case in

much the same way as the report of the Victorian Railways Standing Committee quoted above. (7) Both reports point out the services performed by the railways in the development of industry in States of large area and small populations, while competitors are allowed to take the little remunerative traffic there is.

(d) Transport Committee's Investigation.

17. If any further proof is needed of the superiority generally of the railways, it may be found in a report prepared by the Mechanical Transport Sub-Committee of the Commonwealth Development and Migration Commission. (8) The report concerned the relative merits of road and rail transport for developmental purposes, the specific case being that of the proposed Mallee railway extension, starting from Nowingi on the Mildura line, and running almost due west towards the Millewa bore, but stopping for the time being 35 miles from Nowingi, about half way to Millewa, which is near the South Australian border.

18. A map of Victoria will show that there are at present two branch lines running west from the Mildura line in the Mallee. One is the Redcliffs-Meringur line running, ten to fifteen miles south of the Murray in approximately the same direction as the river, and the other the Ouyen line running in the same direction 60 miles further south, and connecting with the South Australian system at Pinnaroo. These two lines have stations approximately five and a half miles apart, with roads at right angles going ten miles on either side of the railway. Each railway has therefore developed a strip of country twenty miles wide (ten miles on each side), along the whole of its length, the maximum haul of the farmer to the nearest station being about $12\frac{3}{4}$ miles. This would be

the length of haul of the farmer whose holding was situated on the outskirts of the zone and half-way between two stations; he would have $2\frac{1}{2}$ miles to reach the nearest road running at right angles to the railway, and ten miles along this road to the station, as radial roads are not constructed.

19. This is found to be the longest haul that a farmer in that country will undertake, and a railway zone is therefore considered to be twenty miles wide. The two lines are 60 miles apart, and as the zone of the one goes 10 miles south and of the other ten miles north into the territory between the lines, there is a strip of country 40 miles wide to be provided for. This means another two railway zones 20 miles wide, and the proposed railway from Nowingi, which is about 20 miles south of Redcliffs, is to open one of these zones.

20. The Mechanical Transport Committee took this up, and made an estimate of the cost of motor transport to the existing Redcliffs-Moringur line. The figures published in the Railway Standing Committee's report are not sufficiently clear to show how they were arrived at. The Committee claimed that the loss on the new line would be £11,660 for the first year, based on the loss of the Meringur line for first year. It also estimated a present loss of £10,774 for the Meringur line, but the railways dispute this loss. The railways credit new branch lines with 40 per cent. of the revenue they bring to existing lines, thereby reducing the deficit on new lines towards which the Government has to contribute from Consolidated Revenue. The railways consider this quite fair, although it reduces the amount of their subsidy. But the Committee deducted this credited revenue, and made the loss £10,774, instead of £5,825 as stated in the railway report and certified by the Auditor-General.

Its right to do this was disputed by the Railways Standing Committee.

21. In this way the Committee finds a probable loss on the two railways combined £22,434. Its proposal was to substitute five-ton motor lorries, with which to cart the produce of the farmers in the new area to the Meringur railway. As the farmers evidently cannot afford cartage above the present limit, they proposed to perform the service free of charge. The traffic is chiefly wheat traffic, which is seasonal, and it was estimated that two-thirds of it would be handled in 14 weeks. This would require 28 motor lorries for 14 weeks, and the rest of the traffic would require ten lorries for the rest of the year. The estimated cost of this service was £21,630, and it was contended, therefore, that the scheme would save £804. In arriving at this estimate account was taken of the fact that part of the loss on the Meringur line would be wiped out. No provision was made for the building of roads, as it was assumed that the ordinary unformed roads used by settlers would be suitable. But even if roads had to be built, there would be no extra cost, as they would have to be built to the new railway in any case.

22. While the Railways Standing Committee placed on record its appreciation of the investigation of the Mechanical Transport Committee, it could not agree with its views. Sufficient is not said of the estimates to form an opinion as to the merits of the case, but the estimate of the loss of the Meringur line probably had something to do with the disagreement. Apart from this, however, the Railways Committee seems to think that the costs of motor transport would be higher than estimated, and that there would be some double handling of the wheat, as

farmers would apparently be asked to carry it to the road, where it would be picked up by Government lorries.

Since then the Mechanical Transport Committee has undertaken further investigations, which have enabled it further to reduce the estimated costs of motor transport, but no report on these investigations is as yet available.

23. Hence it is still doubtful whether in this particular case motor transport will be cheaper than a new railway line, but the investigation throws clear light on the general question of the most economical means of transport for a commodity requiring freights as low as wheat does. The motor lorries are only recommended, because there is an existing loss on the Meringur railway. Take the loss away, and the new railway would have a difference of nearly £10,000 in its favour. The very fact that it was proposed to operate the lorries free of cost to the farmers, shows that they are by themselves not an economical proposition. They are merely economical because they diminish the loss on a present and a prospective railway.

24. If it is shown that they can do this, they would be justified in this instance perhaps for some years to come. But it is not claimed by the Committee that they would continue to be cheaper; they would be cheaper for the present only because the railways in their first years would be saddled with the cost of a large amount of unused carrying capacity. As the area developed the loss from this cause would diminish and ultimately disappear. That is, at any rate, the expectation, otherwise the building of the lines would not be undertaken. And there is no reason to suppose that the Transport Committee would challenge that; nor would they be likely to contend that motor transport in its present state of development could compete with railways except under these conditions,

as their estimates are based on the facts that there would be a large loss on the railways for some years.

25. Hence there is nowhere to be found evidence to the effect that road motor transport can compete with the railways except under very favourable conditions. Where such competition does exist it merely skims the cream off the traffic, leaving the lower grade traffic for the railways, and the rates charged are never as low per ton-mile as the average of railway rates. The problem lies in the fact that the railways must carry all traffic offering on account of its high overhead costs, whereas the road motor can pick the best and leave the unpayable traffic uncatered for.

(e) The Costs of Road Construction.

26. But this is not the whole story. The railway has to maintain not only its rolling stock, but also its permanent way, and in Australia the cost of the upkeep of the latter is much greater than the cost of maintaining the rolling stock. Road transport, on the other hand, has only to keep the vehicle in order, and to pay a small sum towards the upkeep of the roadway, the greater part of this cost falling on the community. Most countries are now starting to tax motor owners, thereby making them pay something towards the maintenance of roads, but nowhere has this taxation reached anything like the full amount spent on maintenance, and road users pay nothing towards the interest on money spent on road construction.

27. These are large items of expenditure to the railways. It was shown in Section VI. that maintenance of way expenditure on Australian Railways was 17.3 per cent. and interest charges, the largest portion of which is interest on the permanent way, were 27.2 per cent. One

may safely say that 38 per cent. of railway expenditure is expenditure on the permanent way in Australia as a whole. In Tasmania these proportions are higher; the maintenance of the permanent way takes 17.6 per cent., and interest payments 36.4 per cent., of which 29.7 per cent. is interest on the permanent way, making the total annual cost of the permanent way 47.3 per cent. of total expenditure.

28. Costs on this scale for the maintenance of roads are unknown to the motor owner, and were he charged with them he would certainly not be as severe a competitor with the railways. Here as in the case of the railway, a great deal of the wear and tear is due to weather rather than traffic, but motor traffic, particularly heavy traffic, will disintegrate a road at a much faster rate than the old horse traffic. No estimate has been made of how much of the wear and tear of roads is due to traffic and how much to weather conditions, but there can be no doubt that a substantial portion of the need for repair is due to traffic.

29. Mr. William McCormack, Chairman of the Victorian Country Roads Board threw some small light on the subject in his evidence before the Victorian Railways Royal Commission. (9) He said that for the Geelong road the cost of maintenance of 38 miles for the 12 year period 1913-25 was £151 per mile per year. The corresponding figures for the period 1916-25, after the construction of 23 miles of better road, showed that the maintenance cost rose to £199. As the maintenance cost should have diminished with the better road, he concluded that the higher cost was due entirely to the traffic.

30. He also pointed out that the cost was now due almost entirely to motor traffic. After a traffic census on the road he found that only 1.4 per cent. of the vehicles

using it were horse-drawn. This was in May, 1928; only four years earlier (1924) the proportion of horse-drawn vehicles had been 35 per cent. After a rough calculation of the tonnage which passed over the road, he had come to the conclusion that if motor vehicles were to pay for both maintenance and renewals of roads, the cost would be about 0.2d. per ton-mile, which is nearly twice as much as the maintenance expenditure of the Victorian Railways per ton-mile. This would work out at something like £100 for an 8-ton lorry per year. The statement is not very clear, but from the context of the evidence, Mr. McCormack evidently meant a lorry of 8 tons gross weight, including both vehicles and load, as this is the maximum load allowed in Victoria on a road running parallel to a railway.

31. The cost of maintenance of roads does, of course, vary a great deal with the country traversed and the type of road constructed in the first place. The chief engineer of the Victorian Country Roads Board, for instance, reported that a section of the Geelong road cost £470 per mile per annum at one period, when heavier traffic than at present was allowed on it. Generally speaking, the more substantial the construction in the first place, the smaller the cost of maintenance, the traffic remaining the same. But the traffic does not remain the same, and, equally generally, it may be said that the heavier the traffic, the better the type of road constructed, so that maintenance on good roads may be just as high as maintenance on less well constructed roads.

32. There is in every State a mass of roads of quality that varies so much, that a mile of road is not a unit easily identified. Roads are certainly classified into highways, main roads, developmental roads, etc; but this

classification has nothing to do with the type of construction. Likewise, road vehicles are so dissimilar in weight, speed, and type that it is difficult to find an identifiable unit. They range from light cycle cars weighing a few hundredweights, to motor and steam lorries weighing ten to fifteen tons loaded. It is very difficult to assess the amount of damage each does to the road, and to distinguish how much is due to weight and how much to speed. Tyres raise further complications. A light car travelling at high speed on pneumatic tyres will possibly do more damage to a macadmised road than a slow moving tractor on steel tyres. But put the same two vehicles on a bitumen surface and the position may be reversed. The light car will go over it without doing appreciable damage, while the steel-tyred tractor on a hot day may lift the surface off the road as it goes.

33. It is therefore extremely difficult to find a basis on which mechanical road traffic should pay for the maintenance of roads. It may be done on horse-power, or weight, on petrol consumption, or on tyre consumption or some of these may be combined. But care has always to be exercised to see that the tax has not other unforeseen results. In England, for instance, the tax on horse-power has led motor car manufacturers to specialise in light cars with a small horsepower, which are not appreciated in other countries, and the result has been that their export trade has suffered.

(f) Methods of Taxation and Regulation.

34. It may now be convenient to study the methods of taxation and regulation of mechanical road transport in various parts of the world. The methods vary in nearly every country, but they are alike in that the chief purpose is to prevent undue motor competition with the railways

rather than to make road users pay for the upkeep of the roads. This is perhaps natural. There was a time when roads were not free; when road users had to pay tolls for their privilege. That system was abandoned, partly because it was inconvenient, and partly because there came a growing recognition that transport had a value for the community in general, and therefore ought to be free. Nor would the tolls rest where they were levied. Being a tax on costs, they would enter the prices of the commodities transported, and thereby become diffused among consumers generally.

35. Were motor transport the only form of land transport, the same thing would probably happen to-day, and there would be no particular reason for a special tax; it would be far better to tax the motor-owners through their income. But the point is that railways, a competitive service, are at a disadvantage partly on account of the freedom of the roads, and that this disadvantage must be eliminated. It is, therefore, quite natural that the arguments chiefly advanced for the taxation of road users is not that they should be asked to pay for the maintenance of roads, but that they have an advantage over the railways.

36. Motorcars in general are taxed in most countries by a number of means. There are taxes on petrol and taxes on tyres, and nearly all countries have licence fees so heavy as to amount to a tax; that is, they become more than merely charges for the service of registration. This, of course, strikes all forms of motor traffic, whether private or commercial, but the chief forms of taxation and regulation concern the commercial motor vehicles plying for hire, whether they be passenger or freight vehicles. There are various forms of taxes on these, usually a tax on the vehicle in accordance with its carrying capacity for

freight vehicles, and a basic tax plus a tax per passenger in the case of passenger vehicles.

37. But by far the most important are measures of regulation for motor vehicles. These as well as the forms of taxation are comparatively new, and are still being changed from time to time in nearly every country imposing them. Information on the subject is therefore very scrappy, but some of the regulations in force in the United States are of interest. Most of the States require that persons intending to inaugurate a motor service must first get a certificate of public convenience and necessity. Unless the authorities are satisfied that the motor service fills a definite want, which cannot be satisfied by existing facilities, the certificate is not granted.

38. Some States even go so far as to give existing transport agencies in the territory concerned an opportunity to supply the want before a certificate is granted. This is the case in Illinois, and in this State the Supreme Court recently set aside an order by the State Commerce Commission granting certificate to a new service, on the ground that it was economically unsound to encourage a new service where one already existed. In this case the appellant was a railway company, which offered to supply the service required.

39. In other countries solution of the problem is sought by co-operation between road and rail services. This is the case in Germany, where the Railway Company formed under the Dawes plan has succeeded in getting this co-operation. In other countries, the railways enter into direct competition with the motor services, by using road services themselves, and by substituting rail-motors on branch lines where the traffic is small and does not warrant better service than a mixed train, unless a smaller unit is available. This latter practice is spreading to all parts

of the world. The English railways are now seeking the right to run extensive road motor services in an endeavour to curb the competition of existing motor services. It seems that this solution may be the easiest in many countries transport needs co-ordination, and it is difficult to co-ordinate a large number of small competitive units.

40. There is a variety of methods in operation in Australia. In South Australia the railways are running rail-motors on branch lines, and are also actively entering competition on the road with larger and better equipped vehicles than their competitors. An instance of this is the service between Adelaide and Glenelg, where trains for some time have run practically empty. Seeing no possibility of getting the train traffic back, the railways entered the road service with a number of large double-deck motor-buses, which were so successful that other services of the same nature are being opened.

41. In Victoria the same methods are used, but there are also regulations preventing the operation of motor-bus services in the metropolitan area in competition with trams and trains. The railways have used various methods to make the train travel more attractive, including the speeding up of services, and are drawing attention to these improvements by extensive advertising. They have also, where practicable, instituted rail-motor services to provide extra service and to replace mixed services. In this connection, the Victorian Railways have gone further than any other Australian railway system, and have evolved cars that are more comfortable and less noisy than the type of rail motor generally in use.

42. Where these methods have failed the railways have gone out in active competition with the road services, either by running cars from the railhead, or by running road

services the full length of the route. Between Melbourne and Belgrave for instance, the railways ran a motor service from the railhead to Belgrave in connection with their electric trains, but as this did not defeat the competition they instituted a road service for the whole route, abandoning the service from the railhead.

43. In Tasmania the railways have instituted a road service to bring passengers to and from the Hobart station free of charge, in order to compete with the light cars running between Hobart and Launceston, which have the attraction of picking up and putting down passengers at their homes. Rail-motor services are also instituted on some lines. But in addition to this there was a rather unique taxation system. The State was divided into zones, and a separate tax had to be paid by carriers in each zone. These zones were so constructed that if a road ran parallel to a railway line, a number of zones would be crossed in a comparatively short distance, whereas along roads running at right angles to railways, a considerable mileage might be traversed before a zone boundary was struck. This had the effect of taxing motor vehicles running in competition with the railways, and leaving them comparatively free where they ran as feeders. As the tax was an annual one, it did not pay a carrier to submit to it unless he ran fairly regularly over a number of zones.

44. The system was only instituted a couple of years ago, and appeared to work tolerably well, but it naturally proved irksome to owners of commercial vehicles, who succeeded in having it repealed in December last (1926). In its place has been put a tax on petrol, to be levied on wholesale houses, the effect of which will be to distribute the burden among the owners of all motor vehicles, instead of limiting it to owners of commercial vehicles. Care

has been taken to prevent the tax being declared unconstitutional by constructing it on a different basis to that of the short-lived South Australian petrol tax.

45. Each railway system must find its own means of combatting competition, according to the conditions arising in different localities. That there is no panacea is perhaps best illustrated by the action of the Egyptian railways, who in addition to reducing fares have had to offer the extra attraction of increasing the weight of bundles and packages allowed passengers in third class carriages. The Commercial Secretary to His Majesty's Residency at Cairo explains the reason why:-

"The object of this facility is to remove the objection that the fellaheen have to the luggage regulations of the railways, which do not affect motor buses. In this connection, the writer has seen a motor-bus coming in to Alexandria from a provincial centre with 'live calves among the passengers'".

The Australian traveller is not as exacting in his requirements, being prepared to trust his livestock to the carriages provided for them, and the transport war is not likely to have similar spectacular effects in Australia. But it points to the necessity of the railways studying the requirements of the public in an effort to regain traffic. That this is being done in Victoria is shown in Paragraphs 41 and 42 above, and the Tasmanian Railways are making a similar attempt in carrying passengers to and from the railway station free of charge.

(g) Conclusions.

46. There is a definite case for the protection of the railways against motor competition. It was shown in the early part of this section that the road carrier has certain advantages over the railway, but it has also been shown that from the point of view of the community these are to a great extent illusory. In the first place

the road vehicle cannot operate as economically as the railway where sufficient traffic is available, and secondly, the motor car escapes the cost of construction and some of the cost of maintenance of the roadway, which gives it an unfair advantage over the railway.

47. There is, in fact, a discrepancy between the costs the railway users are expected to meet and the costs road users are expected to meet, and as shown in Paragraph 27, the discrepancy is not small, as it amounts to nearly 40 per cent. of railway expenditure. From this must, of course, be subtracted railway deficits, or that part of them not due to the accumulated effect of a bad financial position in the past. But even so the discrepancy is considerable. The difficulty arises from the fact that traffic is being sent by road instead of by railway with a saving to the sender, but at a higher cost to the community when the subsidy to the roads is taken into account. Firstly, it is an inequitable proposition as a larger subsidy is given to one competing transport service than to the other. Secondly, it is uneconomic because it prevents the full utilisation of the railways, whose costs do not go down on account of the smaller traffic. On these two considerations must the taxation of motor vehicles rest.

48. There is a further factor not so far mentioned. The motor-car salesman is becoming an aggressive individual as a result of competition among manufacturers, and is pushing the sales of his wares almost beyond the capacity of the country to buy them, by means of instalment selling. The use of the motorcar is spreading perhaps faster than it ought to, because little capital is needed to buy it.

This has accelerated sales not only of touring cars used entirely for pleasure, but also of the various types of passenger and freight vehicles that come into competition with the railways. The result is often disastrous to

the individual carrier, who will buy a vehicle on time payment, and be satisfied if his traffic returns him a fair wages plus his monthly instalment on the car. A great many of these people enter business for the first time with such a vehicle, and will run it to a standstill. All is well while the car is new and the repair bills comparatively low, but lack of proper care and over-loading will soon make maintenance such a big factor that the owner is driven out of business again.

49. In other words, in nine cases out of ten the small owner is too inexperienced to make proper provision for depreciation, with the result that "while the going is good", he will drive rates far below an economical figure, and is therefore a more serious competitor to the railways, for a time, than an experienced man would be. This type of owner will fix rates as long as he lasts, and when he is driven out, there will be others of his type to take his place. Probably this aspect of the problem is more serious in Australia than in most other countries, where the average wage-earner is less enterprising.

50. When all these factors are taken together, it will be readily seen that the railways must be protected against road competition. It may be argued that where a producer or a merchant can get his goods transported more cheaply by car than by railway, he has every right to take advantage of it. That may be so, but the interests of the community as a whole must be weighed against the interests of the individual, and where the two conflict, the interests of the community must come first. The railways have a fairly definite carrying capacity, and it is wasteful not to utilise it to the fullest. It comes to the question of whether the community can afford to pay for two services where one will do, and in the case of a

State like Tasmania, where the railway deficit is a big burden to the community, the answer must be that it cannot.

51. What steps should be taken to combat this competition is a matter of controversy, and as it is largely a matter of political controversy it has no place here. But one thing must be pointed out. That is, that although the two types of transport service must not run in competition with one another, they are complementary to each other, and the best solution is therefore one that will achieve co-operation between the two. That this can be achieved has been shown by the experiences of Germany and the United States. The motor vehicles have a very definite sphere of usefulness, and must not be discouraged.

52. One of the chief difficulties is that the motor vehicle is at present still in a state of transition, and that no permanent solution seems possible until its progress slows down a little. The motorcar in general use in Australia at present is the petrol driven car. While this type of power seems likely to remain the best for lighter types of cars at least for many years to come, experiments with other fuels seem to prove that there may soon be a revolution in the construction of heavy road vehicles. The Transport Committee of the Development and Migration Commission is experimenting with 5-ton lorries equipped with Diesel oil-engines, burning crude oil, and the cost of fuel for a 150 mile run was 5s. 1½d., as against a cost of about £2.15.0 for petrol. (11) The Committee is also experimenting with producer-gas engines, burning charcoal, and the costs of this type of fuel are said to be even lower. But the cost of fuel is only a small part of the total costs, and has been calculated in England at something like 14 per cent. Economies in other branches of expenditure is therefore also essential.

53. Lord Montague of Beaulieu made a strong point of this constant progress in the House of Lords' debate on the railways' Road Transport Bill. (12) He also pointed out that there had been the same kind of opposition to railways when they were new. "The Economist" also points out that similar tests to those mentioned above are now being made under the supervision of the Royal Automobile Club in England. (13) It is already recognised that while there is a margin of traffic for which road and rail transport are economically competitive, the two services are largely complementary, and can be made to co-operate for the public good. But the present rapid progress of the motor vehicle is a bar to co-operation, since the respective zones of the two types of service cannot be effectively delimited until the progress towards greater efficiency of the road vehicle settles down to the slower pace of railway progress. While one continues to progress at a very much faster rate than the other, no lasting remedy can be found for wasteful overlapping.

54. Finally one argument very commonly used by Australian railwaymen has to be noticed. It is generally argued that as the Australian railways are State-owned railways, there is a greater reason for their protection than there is for the protection of private railways. While this may be a very good political argument, the case to the economist rests on the far sounder basis of increased cost to the community, which is not likely to differ much as between State and private railways. The increased cost is brought about by the decreased use of railway capacity which will be transmitted to the public through increased cost per unit moved. As road competition is effective in the higher grades of goods moved, the railways must try to recoup themselves for the extra costs by raising rates where possible on the lower grades of

goods, thereby raising industrial costs. The readjustments necessary in the industries affected are bound to raise friction, the costs of which cannot be calculated.

(h) Summary.

55. The chief points emerging from this discussion are:-

1. Road competition with railways is now being felt in most countries, and is getting more serious with the increasing efficiency of road transport. The competition is generally more serious in passenger than in goods traffic.
2. In passenger competition the private car is the most serious rival of the railways, and its advantages are of such a nature that it seems impossible to overcome it. Motor-bus services are on a different footing, but they have, within certain limits, decided advantages over the railways.
3. The motor-bus has less in the way of overhead costs than the railway. This is particularly the case with the bus operated by its owner. Even where wages are paid the employment regulations are not as stringent as on the railways.
4. The motor-bus is also more mobile than the railway, and has a greater choice of routes, particularly when it is operated in or near a great city. It has the advantage of being able to change its routes to suit the traffic.
5. The advantages of motor freight services are similar. The truck employed by a firm to distribute its own goods is not on a different footing, as far as the railways are concerned, to the private passenger car. The commercial freight vehicle, like the passenger bus is on a somewhat different footing, but it also has the advantage of greater choice of routes, and has it to a greater degree than the passenger vehicle, which to some extent has to stick to a time table.
6. The road freight carrier has also the advantage over the railways that he can act as the agent of his customer in collecting money due for the goods carried and perhaps even disburse it again in purchases for the customer. This is an important advantage to the small farmer and the small country tradesman.
7. Road transport also offers the advantage of smaller danger of breakages and pilfering. Transhipments are eliminated, and on this account shippers of fragile goods will pay higher for road transport, saving the difference in the smaller risk and less elaborate packing.

8. A further advantage lies in the rapidity of road transport over short distances, and where traffic is light. The delays of the railways are nearly all terminal delays, and these diminish with distance, making the railway faster on long journeys. This may mean a lot of difference in bringing perishable goods to market, as the time saved will ensure the goods being brought to market in better condition. The advantage is greater where traffic is light, on account of infrequent train services.
9. But road transport has severe limitations. One is that it can only compete over short distances, generally stated to be 30 to 50 miles, at present. This is due to the inherent disadvantages of the railway in necessitating cartage to and from railway stations and consequent handling at terminals. The other is that it can at present only handle the goods for which the railways charge high rates, even over comparatively short distances.
10. The net effect of motor competition with the railways is therefore to militate against their fullest utilisation without providing a really more economical means of transport. As proof of the fact that road transport is not more economical where sufficient traffic offers for a railway to be built the investigation of the Mechanical Transport Sub-Committee of the D. & M. Commission into a Victorian railway project is quoted.
11. In addition motor transport has the advantage of getting roads at a very small cost, whereas the railways have a large expenditure in the upkeep of its permanent way. This makes the cost of road transport to the shipper smaller than its cost to the community as a whole, which has to pay for the cost of the road by taxation.
12. The costs of construction and upkeep of roads is difficult to apportion among road users on account of the different types of road and the many classes of vehicles that use them. The apportionment of cost here is just as difficult as the apportionment of permanent way expenditure between various classes of goods and passengers on the railways. If motor transport is to pay for the use of the roads, payment must therefore be by some system of taxation.
13. Various systems of taxation and regulation of road vehicles have been tried in various countries, but the legislation is as yet too new to allow definite conclusions to be arrived at. Different countries must find different solutions to the problem, as local conditions will differ.
14. But the justification for this taxation and regulation is not the cost of the road so much as that the railways are suffering unequal treatment. It must rest on two factors:
 - (a) The inequitable proposition of a larger subsidy being given to one competing transport service to the detriment of another, and
 - (b) that road transport militates against the full utilisation of the railways, which allows productive capacity to go to waste.

15. It is generally agreed on these grounds that the railways must be protected, but at the same time motor transport has its definite sphere of usefulness and must not be discouraged. The best solution seems to be co-operation between the two forms of transport, but this is difficult to achieve while one is making progress at a **much** faster rate than the other. There will therefore probably not be full co-operation before the progress of motor transport has settled down to the steadier pace of railway progress. The present is a time of transition, in which dislocations must be expected.
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X11. THE MANAGEMENT OF STATE RAILWAYS.

(a) State versus Private Railways.

1. The question of whether public utilities such as railways should be government or privately owned and operated has been much debated, and is largely a political problem, on which it is difficult to get agreement. State ownership will suit some countries and private ownership others, and some countries have combined the two types of ownership. It largely depends on circumstances; State ownership in Australia is not on the same footing as State ownership in China or in India, because the types of government are so widely different in the three countries, and because the conditions under which the railways work are so widely different.

2. While one speaks generally of the relative advantages of private and public ownership, it must be understood that the chief issues raised really concern operation rather than ownership. Public ownership in itself means very little. If a State raises capital to build a railway by loan, it owns the railway subject to a mortgage; if a private company builds the railway and leases it to the State for a long period, it is legally privately owned. But providing the State could do what it liked with the plant in the way of alteration and addition, the position would not be widely different from that of a State owning a railway under mortgage, as far as practical effects are concerned. Australian railways are of the first category; i.e., owned by the State under mortgage to bond-holders; but the important fact is that they are operated by the State. (1)

3. For this reason it may be better to speak of State and private management, rather than ownership or control. The latter term is misleading in so far as government control of railway rates and profits is almost

universal. There are only two important countries in which private management of railways predominates, Britain and the United States, and in these public control is rigid. In most countries on the Continent of Europe

and in most other parts of the British Empire the railway systems are under government management. Post-war Germany is a notable exception in that the State railways have been merged into a company under the Dawes plan, but the company is on a rather different footing from private railways generally. Even the name (Deutsche Reichseisenbahn Gesellschaft) implies that the railways are still more or less State property, and the State is a large shareholder, while the management is not unlike that of State-managed railways operated by an independent commission, such as the Indian railways.

4. The chief advantage of private management is generally stated to be better management. A private railway is run for profit, and in order that the profits may be as large as possible, the private company will see to the efficiency of the undertaking. Chapman voices apprehension that under State management the selection of "directing heads" will be inferior to the natural selection of leaders in private enterprise. (2) He stresses the importance of the small economies, which in the aggregate may reach stupendous sums, and which are apt to melt away when private inducements are eliminated from a business. But his chief argument is that the driving force is weakened:-

"Through-going State management ... might turn out a neat business economy, and a well-behaved community; but it is not the docile who seek adventures at home and abroad, push on to new things and create lusty colonies".

He admits, however, that these considerations are not equally weighty with reference to all economic activities; that in the case of some they may be negligible.

5. Pigou admits many difficulties in the management of publicly owned enterprises, setting them out under four heads:- (3)

1. The controlling bodies (Parliament or local government bodies) are chosen for purposes quite other than that of intervention in industry; consequently their members cannot be expected to have special competence for such a task.
2. The fluctuating make-up of a national government or a town council is a serious handicap to settled policy, and will lead to action based on short views, limited by the distance of the next election.
3. The third objection is limited to local bodies. He points out that areas allocated to local bodies are determined by non-commercial considerations, and consequently are likely to prove unsuitable to the working of an industry.
4. Regular government agencies, in so far as they are elective bodies, are liable to injurious forms of electoral pressure.

(b) Difficulties of Comparison.

6. Pigou, however, does not lay much weight on the objection that State managed enterprises must of necessity be less efficient than privately managed concerns. He points out, and quite rightly, that in the large-scale privately owned industry the stimulus to efficiency does not differ much from that present in State managed enterprises:-

"Over a large field of industry the practical choice is, not between private businesses and public concerns but between joint stock companies and public concerns. Here the initiative, freedom and interest of the captain of industry working his own comparatively small business cannot be had in any event. The issue is a different and more evenly balanced one". (4)

This point is of importance, particularly in the discussion of railways, which by nature are large-scale industries, and as a rule something in the nature of a monopoly.

7. Marshall is rather afraid of State management on the same grounds as Pigou, namely, the difficulties

associated with political control, and the danger of constant reversals of policy. (5) Acworth in defence of private railways, says that an exhaustive enquiry "would show that State railway systems very rarely pay their own way; that State purchase of private undertakings is nearly always a failure; that private railways have to their credit almost every important invention and improvement; ... that if it is a question of comparing efficiency and economic operation, comparing like with like, the companies easily beat the State-owned systems. (6)

8. This brings out one of the outstanding difficulties of this discussion, namely the difficulty of comparisons. In the hands of amateurs, railway statistics could easily be quoted in "positive proof" of either contention, namely, that State railways are the more efficient, or that they are the less efficient. The difficulty is that no two railways are alike; there is an infinite variety of curves and grades in the permanent way, making differences not only in cost of construction, but in cost of operation; there is an equally great variety of traffic density and other traffic conditions, which preclude comparison. It has been shown in Section 1, for instance, that it is almost impossible to compare the railways of the various Australian States on account of the many differences in geographical conditions, in construction, in density of traffic, and in conditions of competition. Even within a State the differences in conditions are too great to get a true comparison. In Tasmania one might cite the case of the Emu Bay Railway to show the superiority of State railways or the Mt. Lyell railway to show their inferiority; but both comparisons would be utterly futile, because in all of them conditions other than efficiency of management are responsible for the

differences in financial result.

9. There is another point raised by Marshall which is of extreme importance in this connection. He quotes Sir George S. Gibb for the observation that

"No country has ever adopted State ownership of railways from theoretical considerations. In each and every instance there were some practical reasons, based on military necessities, or concrete and pressing economic conditions, to meet which State ownership was accepted, not as a system desirable in itself, but as an expedient which, in the circumstances, was considered to be the best practical solution of difficulties which stood in the way of the satisfactory development of railways". (7)

Marshall seems to endorse this, as he offers no comment. And it is, of course, perfectly true; but he goes on in the next breath to quote Acworth's statement mentioned above missing what seems to be the most important implication of the statement. This is, that State railways are largely non-paying for the reason that they are constructed for other than purely commercial reasons. This fact alone vitiates any comparison between State and private railways in the aggregate as regards efficiency. This question has already been treated more fully in Section III.

10. On the whole one feels inclined to lean more to Pigou's view, that State enterprise is not inherently inefficient. Pigou even goes further, and says that for a given sum of money, a more efficient engineer or manager can be obtained by a State enterprise than by a private management, for the reason that the position of a public servant is at once attractive in itself, and makes an appeal to altruistic motives. (8) At the same time he admits the difficulty of political interference, but an endeavour will be made to show that this can be minimised.

(c) Relative Efficiency.

11. It is difficult to find any direct evidence that private railways must of necessity be more efficient than State railways. Sherrington finds the balance of advantage in favour of private railways, stating that there is greater efficiency and that the public gets better service. (9) But he brings no evidence to show why this should be so, beyond the mere statement that British and American railways are the best in the world. That may be so, but it does not prove that the better service is due merely to the form of management. Besides, no one has ever challenged the efficiency of the Prussian State Railways. M. Leroy-Beaulieu at the congress of the Royal Economic Society in 1912 quoted the case of a French railway then just taken over by the French Government, which he contended had lost in efficiency as a result of the rigidity and lack of initiative shown by its officials. At the same congress Professor Mahaim of Liege contended that the acquisition of the Belgian railways by the State had conferred such great benefits on the whole people as to outweigh its failure to yield a good financial return. (10)

12. In this case it appears fairly clear that profits were eaten up by "low charges and abundant services," and the fact that the Belgian railways after nationalisation made "scarcely any profit beyond what is needed to pay interest on the purchase price" was evidently attributable to the better deal given the community rather than to inefficiency. Theorists generally favour private management, and theoretically there is a great deal to be said for it, but it must be remembered that governments are not bound to keep on making mistakes nor are government departments of necessity always

incompetent to control commercial organisations.

Pigou rather implies the opposite in his contention that for a given sum of money a government department can obtain a more efficient man than a private firm.

13. One must also give weight to Pigou's point of view that a State managed concern of the magnitude of a railway system cannot be compared with a business managed by its owner; it must be compared with a private business of the same magnitude, which is generally a joint stock concern. And joint stock companies are not of necessity vastly more efficient. It is possible to quote any number of instances of waste and inefficiency in private concerns, and one wonders whether the prevailing belief has not grown up because it is very much more easy for private managements to hide blunders than it is for the management of a State concern, in which the public as a whole takes a greater interest. Just to quote one instance; there was a Tasmanian company, working on a wasting asset, which constantly had to reduce the numbers of workmen engaged. But although this process went on for years the number of the administrative staff of the company was not reduced until the staff became so large in proportion, that it was found possible to reduce it by about one-half, and secure greater efficiency with the smaller number.

14. It is questionable whether this is not now becoming more less general with large scale private enterprise. The growing movements towards "rationalisation" seem to prove that the efficiency of private enterprise can no longer remain unquestioned. And it is perhaps significant that governments are taking a hand in the efficiency campaigns. Even in

America, which prides itself on efficiency in industry and receives delegations from abroad to see how it is done, the government, through the Department of Commerce, is aiding private industry in the elimination of waste and in the standardisation of products. (11)

15. All this does not prove that State enterprise ought to be more efficient than private; nor even that it is necessarily as efficient. That is not the object; the case for State management in such enterprises as railways does not rest on greater or even equal efficiency. But it does seem necessary to point out that the difference in efficiency between State and private enterprise, in the management of concerns of the magnitude of a railway system is not as great as is popularly believed.

(d) Progress under State Enterprise.

16. The most difficult objection is possibly that of Chapman's mentioned in Paragraph 2, that State management will prevent progress, by killing the spirit of enterprise and adventure. It is true that a great deal of our progress is due to the private exploitation of inventions, and that British progress, at any rate, has been to a large extent due to the driving force of competition.

17. Chapman himself tries to minimise the importance of this point by stating that private industry would still supply the incentive to progress, and that the danger from State enterprise would thereby be diminished. (12)
Marshall uses exactly the same argument in pointing out that "even a semi-comatose bureaucratic spirit could not greatly retard progress in a western country, while other

countries were advancing rapidly". (13)

18. One must agree that there is some truth in these statements, but here again there are important qualifications to be made. It must again be kept in mind that the comparison is between State management and management by joint stock company. This does not apply only to railways, but to State enterprises generally, since State enterprise is not contemplated, at any rate at present, in anything but large-scale concerns with a tendency to monopoly. The question therefore becomes one of whether the incentive to progress is greater in the large joint stock enterprise than in State managed concerns.

19. This is not at all certain. Marshall points out there is not much difference between the two, when he says that "experience shows creative ideas and experiments in business technique, and in business organisation, to be very rare in Governmental undertakings, and not very common in private enterprises which have drifted towards bureaucratic methods as the result of their great age and large size". (14) Pigou is also of the opinion that the point is over-emphasised, and that it is diminishing in importance with the growing dependence of industry on non-commercial science. (15) He quotes Dr. Mertz for the statement that while the great inventions of former times were made in countries where commerce was most advanced, the great inventions of the last 50 years have been made in the scientific laboratory.

20. This trend is now fairly easily observable. Governments are everywhere encouraging research in an attempt to aid industry within their borders. And still there is a resemblance between governments and large scale joint stock enterprises, in that the latter also are

supporting laboratories and conducting research in various fields. This type of activity is, in fact, of necessity limited to the enterprise of governments and of large firms; it is too costly to be undertaken by the small employer. And since scientific research has itself become an undertaking requiring large capital, and depending very largely on the State for support, might one not expect State enterprise in the future to be less of a bar to progress than it might have been in the past?

21. Another important question concerns incentive to progress in State industry as compared with incentive in private concerns, notably the large-scale private industry. In the small private firm, managed by its owner, the case is very clear, there is the driving power of self-interest. At first sight one would expect the same to apply to large-scale undertakings, since they are conducted for profit, but there are considerations militating against this viewpoint. While the incentive is certainly there for the directors and managers of such undertakings, it is not as strong even in their case as it is in the case of the owner-manager.

22. But in large-scale enterprises progress does not depend entirely, nor even mainly, on the central executive. It depends to a very large degree on departmental heads and on research workers, who are generally salary earners, and have not the incentive of extra profits. Some firms do, of course, make rewards for inventions and suggestions, but the majority do not. And even where such reward is given, it is often so hopelessly inadequate as to create disgust rather than gratitude in the mind of the inventor. One hears often enough of an employee being rewarded by a few pounds for an invention or an improvement in method

saving his firm thousands of pounds per year. While the case will often be overstated, the fact remains that the inventor is discontented and will have a lessened incentive to further effort, and it does not matter, therefore, to the argument advanced how far the grievance is really justified. The bar to further progress is that grievance, whether real or imaginary. The employee may not have the means of estimating the real gain, nor may the employer, and one is bound to over-estimate while the other will under-estimate.

23. How far will this be the case with State enterprise? The same thing will probably happen, but the attempt to estimate gain may be made more honestly. Against this, there is the disadvantage that State enterprise is likely to be more conservative in trying out innovations, but there is also another possible advantage. One hears often enough of inventions bought up by a private concern, sometimes for fairly large sums, with the only object of keeping it off the market. * These will as a general rule be trivial things in world economy; were they at all big, the chances are that the possible gain in putting them on the market would be large enough to outweigh other considerations. But often a trivial invention leads to more important things, and the practice must be considered a brake on progress. The interests of the individual and the interests of the community are here in sharp contrast, and a State undertaking would not have this same interest in retarding progress.

(e) The Standpoint of the Community.

24. The object of the two preceding sub-sections has been to show, not so much the superiority of State railways and State enterprise generally over private undertakings, as to show that their supposed inferiority is not as great

as is generally believed. We may now pass on to the consideration of a distinct advantage which State management of railways and similar industries with a tendency to monopoly has over private enterprise.

25. Efficiency has an important bearing on the size of the national income. The greater the efficiency of labour, the smaller the amount of labour needed to produce a given income, and the larger the income from a given amount of labour. It has been shown that in this regard the balance of advantage is probably in favour of private enterprise, but not as much in its favour as popular belief would have it. But while a nation must show concern for its aggregate income, the distributional aspect must not be lost sight of; it is just as important to economic welfare as the aggregate income.

25. That private management of railways may not be conducive to the best distribution of the national income is shown by the general recognition that they must be subjected to government control. In countries where there is private management there has grown up a mass of regulation, and generally also controlling bodies charged with the duty of acting as umpires between the conflicting interests of the railways and the public. Such bodies are the English Rates Advisory Committee and the United States Interstate Commerce Commission.

27. The chief reason for control is the fact that a railway is by nature a monopoly. Competition by two railways in the same district does occur, but is wasteful, and the companies concerned sooner or later arrive at a recognition, of this, and come to an agreement, or combine. Similarly, other competitive forces enter, such as mechanical road transport, but even in this case the trend seems to

be in the direction of combination, or at least close co-operation. We are still far from the realisation of this aim for the reason explained earlier, namely that motor transport is still progressing too rapidly, but the aim seems fairly clear. Pigou, indeed, considers, that "the interests of the national dividend requires that where a number of establishments, whether in the same industry or in different industries, are competing for the supply of some public need, that one which can supply it most efficiently, shall oust the others". (16) In transport this is certainly desirable.

28. That such control is difficult is unquestioned. There are hundreds of ways in which a private enterprise can evade regulations and restrictions. Examples of the difficulties of the Tasmanian Government in the classification of the expenditure of the Tasmanian Main Line Company were given in Section V. Instances have also been quoted (Section IV, Paragraphs 30 and 31), of the same kind of difficulty in other countries, because it is difficult to get behind the figures of the accountant. As this has an important effect on rates, through the discrepancy between real and apparent earnings, it must be regarded as one of the disadvantages of private management from the public point of view.

29. It is equally difficult to enforce rates once they have been decided on by the controlling body. Ripley furnishes a number of examples from American Railways, (17) showing that it can take any number of forms. Under-classification, for instance, is a problem all railways have to deal with. Nails and fine brass hardware pay different rates, but who is to know whether a shipment of brassware is billed as nails without investigation of the packages? The utmost vigilance is often necessary to see that this sort

of thing is not done. Ripley mentions an investigation in 1893, when 183,575 such false descriptions were detected on west-bound shipments from the United States Atlantic seaboard alone, and if this sort of thing is done by collusion between shipper and carrier, detection is almost impossible.

30. Another favourite form of rate control evasion is that of allowance for the use of the shipper's own rolling stock. It was by such rebates that the American railways built up the Chicago meat packing trade; they made allowances for the shippers using their own refrigerating cars out of all proportion to the value of the service. This kind of personal discrimination is not in the interests of the public; it tends always to build up a few large business houses at the expense of others. It may be done by secret rebates, but it is also done "within the law". A favourite method in America has been to file a new rate schedule according to law, reducing rates on a particular commodity, and then before the general run of shippers has had time to take advantage of it to restore the old schedule. In the meantime, one man, say a cotton buyer, has been informed of the day on which the low rates will be in operation, and sees that he has large shipments of cotton to go forward on that date. As his knowledge allows him to offer slightly higher prices, he will invariably have a large shipment ready.

31. The control exercised by public authorities over railways is chiefly one of rates, and this is due to two causes. One is that it is generally felt that in the conduct of a public utility, the owners are not entitled to more than a fair profit. The other is that in the endeavour to make a profit the railways may injure one

section of the community by actively aiding another section in making unreasonable profits. That control is difficult has been shown by the examples given above. These are all from America, but the British Advisory Board complained only recently that it was almost impossible to curb the railways' special port-to-port rates injuring British coastwise shipping, because they could not be discovered.

32. Injurious discrimination therefore exists to-day, despite controlling bodies and regulations. And it will probably continue to exist as long as there are private railways competing for traffic, whether the competition be with other railways, or with some other form of transport.

33. The reason for discrimination was stated very clearly by a witness before a United States Senate Committee in 1886. The witness explained that if he were manager of one of two competing roads in a wheat area, and wished to get all the traffic, he would pick out one "smart, live man" and give him a small concession. He would then get the bulk of the business and bring it to the line. "If you give it to five", he added, "you might as well make it public and lose what you intend to accomplish ... You can take one man and build him up at the expense of the others, and the railroad will get the tonnage". This type of dealing is certainly not in the public interest; but it cannot be entirely eliminated, even with the strictest control.

34. There is the further factor that a railway will encourage transport for its own sake. The evidence of another American railwayman was quoted to show this in

Section VII, Paragraph 68. Here is a case in which the best interests of private railways will militate against general productive efficiency; the "carrying of coal to Newcastle" is so clearly uneconomical that it needs no further comment.

35. The general conclusion must be arrived at, that as far as the distributional aspect of national economy is concerned, private railways leave much to be desired. State railways, whatever be their faults, will not commit sins of this nature against society. That private railways will resort to anti-social practices is an argument for their control; the fact that they are to some extent uncontrollable must be an argument in favour of State railways.

(f) Political Influence.

36. While an endeavour has so far been made to minimise the disadvantages of State railways, one serious drawback yet remains to be dealt with. That is the fact that State managed railways are open to political influences that are likely to harm them. It is in the nature of State enterprises that people with grievances against them will seek redress through political channels. Moreover, there is no guarantee that the general policy of State railways will not become an object of party politics.

37. This is in particular the case with new railway construction. There is no end to the intrigue that will be indulged in, in order to get a railway line built. Cases of this kind of thing have been quoted in Section III. Support for the building of a new railway line may be the price paid by a political candidate for his election, and whether he earnestly believes it necessary or not, he is

bound to make an effort to bring it about. In this way, lines are built that never have a hope of paying. Expert advice counts for less than political expediency, and the community pays the price.

38. Political interference in the management of railways is also a grave obstacle to their efficiency. Early Tasmanian railway reports are full of complaints against this practice. In the early 'nineties, the manager complains that free passes have to be granted and concessions in rates made to such an extent that the revenue could be trebled were he able to make his own rates. This seems likely to be an exaggeration, but he points out in a later report that the department is called upon to perform services for Government departments free of charge in addition to concessions, which are practically subsidies. The complaint becomes more bitter in the report of 1895:-

"In my last report, I invited attention to the fact that the Department is called upon to grant concessions to nearly every branch of the public services, and I may now add to almost every public movement in the colony. The practice of giving free passes has now grown to such an extent that the staff find it difficult to keep a check".

39. This kind of thing appears to have been fairly general in most of the Australian States. Government Departments made use of the railways without making any contribution to their revenue, and furthermore it was found politically expedient to make donations to public bodies at the expense of the railways. This practice has been considerably curtailed in late years, but it must be kept in mind that it has contributed towards the cumulative effects of past deficits.

40. There are, however, numerous other ways in

which State railways are hampered by political influences. There must be plenty of instances of these in all the Australian States, but they only see the light at such intervals as Royal Commissions are appointed to enquire into the running of the railways, and not always then. But there was such an occasion during the sittings of the recent Royal Commission on the Victorian Railways, and a great many instances of the bad effect of political influence were shown in the evidence of the Chairman of Commissioners, Mr. Clapp. There was a full discussion, as the Minister for Railways and later the Premier made statements in Parliament attacking the Chairman, to which the latter replied with further evidence. (18)

41. ; There was a large number of complaints, a few of which will be sufficient to illustrate the seriousness of the matter. Two outstanding examples were connected with the relations between the Commissioners and their employees. The Commissioners had instituted a bonus system in their workshops, granting a bonus to men who exceeded a certain output. They claimed that in one case the output was increased by 120 per cent., in four cases from 43 to 50 per cent., and in a number of cases smaller increases had been achieved. The Minister of Railways stated that the Government had decided on its abolition "in order to secure more harmonious working", but the Chairman of Commissioners in further evidence showed that trade union officials had declared themselves satisfied with the policy of the Commissioners. The same applied to the policy of doing piece work by the so-called "Butty gangs", which the Government decided to limit.

42. An acrimonious discussion also took place

concerning the type of truck to be adopted as the standard on Victorian railways. The standard had, in conformity with general practice, been gradually increased from a capacity of 6 tons to 7, 8, 11 and 16 tons. The Commissioners wanted to replace the 16-ton standard truck with a 25-ton truck, which general experience on other railways has proved more efficient, as it has a smaller proportion of tare to capacity than the 16-ton truck. The Minister said that the Cabinet had vetoed the building of 25-ton trucks, because the 16-ton truck suited shippers of wheat in the country better. To prove this he made the statement that the Railway Department received very few requisitions from shippers for 25-ton trucks. Mr. Clapp in his reply went a little further by saying that the Department did not receive any orders for 25-ton trucks, for the simple reason that the railways had none, and therefore could not supply them.

43. This is clearly a case in which expert judgment ought to be taken in preference to political, and a similar case is presented by a request from the Commissioners for the installation of automatic couplers. This was a large item of £180,000 per year for ten years, and the Government vetoed it on account of the unsatisfactory state of the railway finances. It was pointed out in evidence that safer and more economic working would result as the new couplers would provide the stronger draw gear necessary for the heavy trains now being used. The savings for the first few years were put down at £50,000 per year, and when the system was in full working order, savings amounting to £100,000 would be realised.

44. There were also allegations concerning undue

preference to Australian goods. The Commissioners did not object to the settled policy laid down for the Department that a certain percentage of preference should be given to Australian tenderers for equipment; they realised that this was a political question on which they had no right to give advice. But there had been cases where further preference had been given than that laid down. One related to the purchase of air brake hose-pipes. The Australian manufacturer had quoted within the preference limit, but tests had shown that the British hose-pipe differed so much from the Australian in quality, that it would give 90 per cent. more service, and when this was taken into consideration, the Australian quotation was far outside the limit. Nevertheless, the Minister ordered the purchase of the Australian product. Another case was given in which an Australian tenderer had been outside the preference limit, and had been allowed to requote after having been given information of the quotes of his British rivals. The Commissioners pointed out that this practice would lead British manufacturers to cease giving quotations, to the detriment of the railways.

45. There were many other examples of political interference detrimental to the efficient working of the railways. The evidence of the Chief Commissioner was actively backed by a former Minister of Railways in Victoria, Mr. F. W. Eggleston. (19) Mr. Eggleston told the Commission that the pressure brought to bear on him, while Minister, was tremendous; his term of office had been one long tug-of-war with adverse political influences, the greatest difficulties arising from demands for freight reductions by farmers. There was, he pointed out, a great danger of freight rates being used

for political bargains between candidates for Parliament and the electors in country districts.

46. The report of the Royal Commission which enquired into the working of the New South Wales Government Railways shows that the Commissioners, Sir Sam Fay and Sir Vincent Raven, both English railway experts, were apprehensive of the difficulties created by political interference in the management of the railways. The evidence showed chiefly financial difficulties due to the Treasury having direct control of railway finances, but they point out in their report the necessity of giving the Railway Commissioners a free hand in matters of management generally.

47. With this object in view they recommended that the Chief Commissioner should not be appointed for only seven years, but that the appointment should be made for life, the Commissioner to be removed on proof for misbehaviour or incompetence. "Governments come and go", states the report, "policies change and are reversed according to the political hue of the Ministry of the day, but the transport needs of a State are constant; they are vital facts in the everyday life of all the people and should not be made in any way the shuttlecock of politics".
(20)

48. There can be no doubt but that political intervention in the management of State railways is a serious drawback, and is liable to nullify any advantages that they may have over privately managed railways. It is not merely a matter of ministers being meddlesome by nature; the difficulty is that ministers are constantly pressed by criticism in Parliament to take action that is often injurious to the railways. And the private member in Parliament is himself being pressed by constituents with an axe to grind.

(g) Summary.

49. The advantages and disadvantages of State railways generally may be summed up as follows:-

1. While railways or other public utilities are generally spoken of as State or privately owned, ownership matters less than management, and the Section discusses the relative advantages of State and private management rather than ownership.
2. The chief advantage of private management is generally stated to be better management. Several authorities are quoted for this view, but the argument is weakened by the fact that the comparison is not generally between State enterprise and the concern managed by its owner. The comparison must be between State enterprise and the large joint stock company, which is not vastly more efficient. This certainly applies to railways, whose capital requirements are too large to be met by a single individual.
3. The difficulties of comparison must be stressed. No two railways are alike, and even the working conditions on one railway will alter from time to time. It is therefore impossible to take any given State railway and compare it with a private railway. The difficulties of comparison are made greater by the reason that State railways are usually built because they are undertakings considered too risky by private enterprise.
4. It is questionable whether the prevailing belief in the inefficiency of State railways has not partly grown up because it is much more easy for private concerns to hide blunders than it is for State enterprises, in which the public takes a keener interest. It is at any rate a relic of the days when the small business managed by its owner was more common than it is to-day. The growing movement towards "rationalisation" may be cited as showing that private enterprise leaves something to be desired. It is significant that in America, a country looked upon in business circles as the home of efficiency, this movement is led by a Government Department.
5. In regard to scientific and industrial progress under State enterprise much the same arguments apply. The comparison again is with the joint-stock company, where incentive is not as great as in the case of the owner-manager. To the latter the industrial progress of last century was due; but today industrial progress is made in the scientific laboratory, and research is undertaken chiefly by government aid, although a great deal is done by private enterprise large enough to afford it.

6. The previous discussion has not attempted to show that State enterprise is more efficient than private, but that if there is any difference in favour of private enterprise, it is not as great as is popularly imagined. The positive ^{and} advantage of State enterprise, in railways, similar public utilities lies not in any possible increase in the national dividend, but in a better distribution of it. It is generally recognised that private railways have to be controlled, but effective control is difficult, if not impossible. Private railways will evade rate control and encourage wasteful transportation.
7. A serious drawback to State railways is political influence in the management. Cases quoted relate chiefly to the Victorian Railways, brought before the recent Royal Commission. But they appear to exist everywhere. It is bad because it often means that political expediency ~~often~~ takes precedence over expert judgment, and because it may at times mean a complete change in policy, Governments being what Mr. Shaw calls "deciduous" bodies.
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XIII. POSSIBLE REMEDIES.

(a) The Position in Australia.

1. A discussion as to whether Australia would be better served by private than by State railways would be of little practical importance. No Australian government would contemplate handing over its railways to private enterprise; State ownership and management of all important railways is a settled policy, which it would be difficult, if not impossible, to reverse.

2. What Marshall says of State railways generally, namely that no country has adopted State ownership from theoretical considerations, is largely true of Australia. Most Australian railways have been built for the purpose of extension of settlement to new areas; in the fostering of a developmental policy rather too impetuous to suit private enterprise. For this reason most Australian railway projects have not looked particularly enticing to investors, and the States have had to undertake them. Colour is lent to this view by the fact that most private railways in Australia (e.g. the Mt. Lyell Railway and the Silverton Tramway serving Broken Hill) have been railways built to serve mining fields, where the prospects of getting a fairly dense traffic in the immediate future have seemed fairly bright. (1)

3. Comparisons are often made between the United States and Australia. America, it is argued, was a country in much the same position of Australia, and has found the policy of railway management by private enterprise possible. But the two countries are not comparable, at least not in regard to the need for railway facilities. The United States was far more thickly populated than Australia when she began railway building, and there were far greater prospects of profitable working

than in the case of most Australian railways. Canada is perhaps more nearly comparable to Australia in this respect, but private management in Canadian railways has not been particularly successful.

4. Nor must it be imagined that American railways have been an unqualified success from the point of view of the public. There have been some dear failures to pay for. Ripley shows that in the 30 years from 1882 to 1911 no less than 587 railway companies with a capital of £1335 mill. and controlling in the aggregate 117,656 miles of line had to be placed in the hands of receivers. (2) There has been wasteful competition, and serious discriminations in rates between persons, militating against sound economic development. And in some instances large grants of land have been given, giving the railway companies undue power in the districts through which they were constructed.

5. Possibly Australia could have induced private companies to build some developmental railways by such grants of land, and in this respect it may be said with some truth that theory has had something to do with State railway ownership. The beginnings of railway development in Australia coincided with the gradual recognition that the large land grants of the past were a bar to further progress in land settlement, and undoubtedly the spirit of radical nationalism of the 'sixties and 'seventies, which changed our land and fiscal policies, was a contributing factor. But whatever be the cause, it seems beyond doubt that Australia is not likely to change the policy adopted.

6. From this point of view it seems futile to discuss the relative merits of private and State

management of railways as far as Australia is concerned. But there is another justification for it. Private railways have been shown to have certain definite advantages over State railways, and there is no reason why Australia should not endeavour to learn from the experiences of countries which have adopted private management. An endeavour was made in the last section to show that State railways need not of necessity be much less efficient than privately managed railways, but that they generally are less efficient on account of political pressure on the management. To this may be added the disadvantage of a certain instability of finance, owing to the fact that railway revenue in many countries with State railways is treated as part of consolidated revenue and that their expenditure is part of the general budget expenditure. The object of this section will be to examine possible remedies for these difficulties.

(b) Politics in Railway Construction.

7. One important difficulty is that of political pressure for the construction of railways, which was dealt with in Section III. In Sub-Section (b) an endeavour was made to show that partly on account of this and partly due to another factor, it is much easier for a government to undertake mistaken construction than it is for a private company. The effect on subsequent management is obvious; the managers of State railways will as a rule have smaller prospects of success than the managers of private railways, because the decision to construct has not been preceded by the same careful consideration of prospective revenue.

8. Steps are now taken by most countries to

minimise this danger of constructing railways with little hope of ever paying. The system followed in Victoria will illustrate some of the safeguards possible. The Victorian safeguards consist of a close investigation by a Parliamentary standing committee, the provision of land free of charge to the State by the districts concerned, ^{and} the granting of subsidies to the Railways Commissioners for the early losses on the lines constructed for developmental purposes.

9. The Railways Standing Committee came into being as a result of what was possibly one of the worst attempts known at forcing a State into speculative railway building. In 1890 the Gillies-Deakin Ministry submitted a railway construction bill (known as the Octopus Railway Bill) seeking the construction of no less than 43 new country lines and 10 new suburban lines at an estimated cost of £8 mill. When the Bill was brought before Parliament a number of members were ⁵disatisfied because ~~of~~ their own pet projects had not been included, and these malcontents asked the Ministry to include another 57 lines in the programme, making a total of 110 new lines. While the Ministry was trying to find a way out of this embarrassing situation, the land boom collapsed and a counter-agitation against a large construction programme made itself felt.

10. This led the Government to decide to follow the example of New South Wales, and set up a Parliamentary Standing Committee on Railways, which ultimately recommended the construction of ten lines, and rejected the other hundred. The Committee at present consists of six members, two from the Ministerial side of the Legislative Assembly, two from the Opposition, and two from the Legislative Council. To this Committee is referred every project for railway construction. The Committee sits in

public and takes evidence from the people of the district concerned, and evidence from experts as to the probable cost of construction of various routes. If the Committee at this stage considers it unwise to proceed with construction, the matter drops; if not it selects a route and asks the Railway Commissioners to report on probable revenue and expenditure. This work is undertaken by experienced traffic officers, who have been found in practice to come very close to estimating the actual loss to be expected. With these facts before them the Committee then reports to Parliament.

11. The second provision mentioned, namely that of making the landholders of the district provide the land required free of charge should also tend to minimise the dangers of ill-considered construction. It really amounts to a "betterment tax", and should provide a brake on local enthusiasm. The usual procedure is to form the Municipal Council into a Railway Construction Trust, empowered to raise funds either by a bank overdraft or a loan, from which to pay landholders. The loan is repaid over a number of years, the money being raised by a rate levied on the settlers who have benefited, graduated according to their distance from the railway. The local body has the advantage of being in a better position to know local land values, and it is claimed that this alone has been responsible for considerable savings.

12. The third provision is not without its importance. The estimate of possible loss by experts shows Parliament clearly what has to be expected, and Parliament will pass the bill in full knowledge of the future liabilities it will incur. Here again is a provision that will tend to make Parliament think twice before it authorises the

construction of a line involving a big annual loss in working. While these three safeguards cannot be expected to prevent errors in construction, they will all tend to minimise them.

(c) Independence of Management.

13. The complete elimination of political pressure from the management of State railways is undoubtedly difficult. There is a natural hesitancy in a democratically constituted body to give away its power to people whom it conceives as potential autocrats. But democratic government is unfortunately not designed to run commercial undertakings, and it becomes at times necessary to protect democracy against itself. It is not suggested that Parliament should divest itself of all power in connection with such an enterprise, but it should be content with deciding only broad principles, and leaving the carrying out of these principles in detail to an independent management.

14. It is, of course, difficult to know where to draw the line between the powers which Parliament ought to retain and the powers it ought to resign. There is a further difficulty in the interpretation of the principles laid down in detailed policy. Doubtful cases, in which the management will have one interpretation and the government another, will of necessity arise, and do, in fact, arise where the management is allowed a certain amount of power. Such cases constituted the greater part of the grievances of the Victorian Commissioners against successive governments.

15. But there were also definite complaints as to sections of the Railways Act giving ministers power to interfere with the Commissioners. The Commissioners did

indeed, make this the central point in their statement, pointing out that they did not object to ministers exercising their lawful power, but to the existence of such power. They pointed out that while such powers existed ministers were entitled to exercise it, and did exercise it - to the detriment of the railways. And Mr. Eggleston in his evidence showed that the reason for the interference by a minister was pressure from the electorate, either acting directly or through the medium of members of Parliament. A minister, he said, was always liable to be called a "rubber stamp", if he got into the habit of letting the Commissioners come to their own decisions. It is easy to understand how a weak minister in fear of Parliamentary derision will submit to political clamour rather than assist the Commissioners.

16. There were several sections giving the Ministers powers, which the Commissioners objected to, but their chief objection was to Section 101 of the Victorian Railways Act. This section constitutes a kind of dragnet, which gives the Minister almost complete control over the detailed working of the railways. It provides that the Minister may at any time request the Commissioners to submit to him a scheme for carrying out any matter of general policy specified by the Minister. If he approves, he may order the scheme to be put into operation, but if not he may himself transmit to the Commissioners any proposition concerning such matter of policy, and ask them to give effect to it.

17. The section is so general in its terms that it may be made to apply to the merest detail, and it is undoubtedly bad in principle, in that it allows political pressure to be exerted to its fullest extent. That this

was not intended is clear from its history. The clause was originally drafted to include 14 matters of policy, closely defined, on which the Minister might exert power, but was objected to by members as savouring "of the re-introduction of Ministerial control in administrative matters". The Minister in charge of the Bill then drafted the present clause as a compromise, but in actual practice it has proved more far-reaching than the original. The New South Wales Railway Act does not seem to give nearly the same power to the Minister, although it does reserve him some power.

18. Apart from this, Commissioners should in order to be reasonably free from political pressure have a fairly lengthy term of office. If not, they are liable to give too much consideration to the possibility of re-appointment, which will rest with the government of the day. There are cases, for instance, of railway commissioners, nearing the end of their term, retrenching expenditure far more than is economical for the purpose of showing a maximum of net earnings; something which will seldom fail to pass as evidence of efficiency. The New South Wales Royal Commission of 1924 thought seven years too short a term, although this a maximum in Australia. The terms vary in other States, but none is probably as short as the two-years' term given the recently appointed Commissioner of the Tasmanian Government Railways. A Commissioner with such a short term must be entirely dependent on ministerial control.

19. It is questionable whether the interest of the public would not be better served by taking the power of control away from the minister and giving it to some extra-parliamentary body, similar to the Commonwealth Bank

Board. While this Board would give the Commissioner control over details, it could give attention to matters of general policy without being subjected to political pressure to the same extent as the Minister. To such a body members could be appointed representing various classes of railway users, and liaison with the Government could be secured by the appointment of an official of the department concerned and possibly also a Treasury official, while the Commissioner, or Chief Commissioner, would act as chairman. This matter is further discussed in Appendix Klll.

20. The advantages of this principle are easily recognised in the case of a Central Bank, charged with the control of the currency of the country. It has been adopted by most of the leading nations of the world, and the Genoa Conference in 1922 asserted that "banks should be free from political pressure and should be conducted solely on lines of prudent finance". The reform was in most countries due to the currency difficulties following the war inflations; in Tasmania the railway deficit is a sufficiently large proportion of total public expenditure (about 12 per cent.) to cause alarm.

(d) The Railway Budget.

21. The relations of Government railways to the Treasury have not yet been dealt with. The system generally in use in Australia is to include railway accounts in the general budget, all revenue being paid into the Consolidated Revenue Fund, and all expenditure being charged against that fund. While this system is an excellent one in public finance generally, it has certain serious drawbacks to a trading department.

22. One of the chief faults of the system is that

when the accounts of the Consolidated Revenue Fund are closed each year, all unexpended balances must be paid back into the fund. When this rule is applied to a commercial undertaking, it means in practice that the concern goes entirely out of business on June 30th of each year, and starts de novo on the following day. This must naturally hamper an undertaking which must go on uninterruptedly if it is to be efficient. There is always work going on the year round, and if this work has to be interrupted at the end of each financial year, it cannot be done economically.

23. The Acworth Committee on the Indian railways in 1921 pointed out the difficulties experienced by the management of the railways in losing their unspent balances at the end of the financial year. There is usually a rush at the end of the year to complete as much work as possible so as to get the maximum benefit of the vote of the year; but once the year has ended, the work has to be seriously curtailed, owing to the provision usually in force that the expenditure per month must not exceed the average monthly expenditure of the previous year. The more the railway system grows, the greater this handicap becomes, but even where there is no growth to speak of, there are difficulties. The budget is usually not dealt with until three months after the end of the financial year, and then only do the new votes become available. This means that they have to be spent in nine months, instead of being spread over the whole twelve months, and the result is a slackening of effort in the first three months of every year.

24. Another difficulty found to have importance in India by the Acworth Committee was that railway expenditure was entirely subordinated to the needs of the Treasury.

When funds were plentiful, the railways were allowed a generous sum for such items of expenditure as maintenance and renewals, but when the Finance Member found himself in financial difficulties, he would curtail the expenditure of the railways. The Committee quotes one or two rather bad cases. One is that of instructions being given for the construction of a new line to proceed for six months, with the addendum; "There is no expectation of any money being available for this line in the next year, and work may have to be suspended". (3) The other case quoted was that of rolling stock being purchased in England at the expense of Rs.43 lakhs, and lying idle on arrival for want of Rs.8 lakhs expenditure on erection in India.

25. The effect of this hand-to-mouth finance must be disastrous on a concern going continuously. For its proper maintenance and development a railway requires a carefully thought out expenditure both on capital and revenue account for some years ahead, but this is impossible under such conditions. The difficulties are clearly seen in the case of Australian railways. The true financial position of the undertaking becomes obscured, the distinction between capital and revenue expenditure at times becomes confused, and there are always chances of capital lying idle when it ought to be earning revenue.

26. The New South Wales Royal Commission, mentioned earlier, found itself faced with the same problem, and one of its chief recommendations was the separation of the railway budget from the general budget of the State. The Commission found that while the financial year begins on July 1st, the authority for working on the estimated basis is not given until late in October or early in November, the result being that in many instances the money voted could not be spent between the time of approval

and the following June. The difficulty was very clearly summarised by Mr. James Fraser, the Chief Commissioner of Railways, in his evidence:-

"It has a deterrent effect in connection with the mapping out of a programme of expenditure during a given year. No one in an administrative position can lay out a programme of expenditure for a whole year, unless he knows that the money will be made available to spend, because you really want to begin to spend on the first day of the 12 months and continue that expenditure fairly consistently through the whole year. That is a thing the Railway Department has never been able to do, either from a loan or on working expenditure".

(4)

27. One of the chief difficulties is the maintenance of stability of employment. The maximum amount of labour is employed during the last few months of the financial year in order to use as much of the funds voted as possible, while the end of the financial year means the putting off of a number of employees, for whose employment no money is available. At a time when decasualisation of employment is looked upon as a remedy for the ills of other industries, this is surely a bad example to be set by a State undertaking. Not only is it bad for the labour concerned, but it is bad for the railways. In the first place rush work is not good work; when a department is striving feverishly to spend a given sum of money by a certain date, economical spending becomes a secondary consideration. Secondly, the kind of labour found to take casual employment is not the best labour, and, thirdly, there are certain overhead charges in connection with the work, which must go on the year round.

28. As the Commission pointed out, "the principle of yearly State budgets .. was not devised to meet the needs of a commercial undertaking". This has, in fact, been recognised by a number of countries, and the practice of separating railway finance from the general budget is

growing. In Prussia the question came up as early as 1878, but the project of separating the railway budget failed, because the railways were too prosperous, and there was too great a temptation for the treasury to make the best of this large non-voted revenue. But in France, Italy, Switzerland, Japan, New Zealand, South Africa, and India the railways have now their separate financial organisation.

29. The new organisation in India was introduced with the budget of 1925. The Indian railways are prosperous, and it was established that they should make an annual contribution to the Government's revenue in addition to providing for interest on their debt and depreciation. Sir Basil Blackett, the Finance Member of the Government of India, in giving evidence before the Victorian Royal Commission in May last, explained that the new arrangement was just as advantageous to the Treasury as to the Railways, in that it stabilised the contribution of the railways to Consolidated Revenue, and made budgeting easier than in the past. (5)

30. The New South Wales Government has not yet acted on the recommendations of the Royal Commission in regard to railway finance, but a Bill is being drafted, and will shortly come before Parliament. The scheme has evidently not yet been tried in a country the railways of which are in as bad a financial position as those of Tasmania, and one would hesitate to advocate the principle being put into operation in this State until such time as the railways had been put on their feet financially. It would be necessary first to write down capital to a reasonable figure, to close lines which have no chance of ever paying ^{working} expenses, and to give the Commissioner more power than he has at present.

(e) General Conclusions.

31. In the last four sections an attempt has been made to analyse the problems facing State railways generally, and Tasmanian railways in particular, and some possible remedies have been suggested, based principally on the experiences of other railways. As this thesis is intended principally to deal with the Tasmanian Government Railways, it may now be convenient to sum up first the difficulties with which the railways are faced, and, secondly, the suggestions for possible improvement.

32. In Section X it was shown that the Tasmanian railways are in a financial position worse than that of any other State in the Commonwealth, with an accumulated deficit equal^ling 76 per cent. of the capital invested, exclusive of accumulated depreciation. It was also shown that the annual deficits are growing larger year by year. It was pointed out that one cause was serious over-capitalisation, and it was further shown that this must have a disturbing effect on rate fixing, as "cost of service" becomes difficult to determine. Finally two methods used in connection with the over-capitalisation of the Victorian Railways to determine its extent were outlined.

33. In the last sub-section of Section X it was shown that part of the cause for the difficult financial position lay in the fact that there are a number of branch lines, which have never paid working expenses since their inception, and will probably never be able to earn working expenses. The position of the worst of these lines was shown, but figures for the others were not available. Two of them, the Sorell line and the Barrington line, have now been closed.

34. In Section XI an attempt was made to show the difficulties created for railways in general by growing road competition, and further, that this problem is more acute in Tasmania than in most other countries in that the distances are short, giving greater advantages to motor transport. It was further pointed out that as railways are necessary to the transport system of the State, it is essential to protect them against undue competition, which becomes wasteful in two ways; by depriving the railways of traffic necessary to economic working, and by increasing the costs of road construction and maintenance. Finally an outline was made of the methods used in other countries and in Tasmania to protect the railways against this competition.

35. In Section XII an outline was given of the relative advantages of State and private railways, and it was shown that generally speaking private railways will have some advantage in greater efficiency and greater stimulus to progress, but that the difference may not be as great as commonly imagined. State railways, on the other hand, have an advantage when the distributional aspect is considered, in that they are less likely to foster concentrations of wealth. But the worst difficulty in regard to State railways was shown to be the danger of political interference with the management. In this section an additional difficulty, that of making railway revenue and expenditure part of the general budget, has been considered.

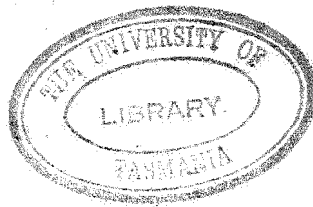
36. The Tasmanian Government Railways, then, suffer from all the difficulties associated with State railways generally, in addition to the special difficulties of their own. To minimise these difficulties, a number

of suggestions have been made, and these may be summarised as follows:-

1. It is necessary to remove from the books of the Railways the large amount of capital in excess of the real value of the assets it is supposed to represent. This will not lighten the interest burden to the community, but it will admit as deadweight debt what in effect has become such, and will make for better book-keeping. In addition it will put rate-fixing on a far better basis, as reasonable "cost of service" will be shown, and it will have an effect on railway management generally in making easier the task of "making both ends meet".
2. It seems only reasonable that non-paying lines of the type dealt with in sub-section (g) of Section X should be closed. Consideration must of course, be given to the people of the districts served, but in most cases the lines are short, and run alongside good roads, which the inhabitants generally use now.
3. In regard to motor competition it is difficult to suggest any improvement in the restriction until recently used on commercial motor vehicles. As far as can be ascertained that legislation worked reasonably well, and ought to have been given a longer trial. It is unlikely that the petrol tax substituted will work as well. There may, however, be possibilities of the railways running road services themselves as in some of the other States, but careful investigation of the possibilities must be undertaken before such a step is taken.
4. There seems to be no known remedy for the loss of passenger traffic through the growth in the number of private cars. The only question to which consideration might be given is whether this growth is not faster than what the community can afford, and whether for that reason the increasing cost of road maintenance should be thrown entirely on the shoulders of motorcar-owners. The new petrol tax may help to do that, but will not bring in anything like sufficient revenue.
5. More power must be given to the Railways Commissioner to make the management of the railways less subject to political interference, which militates against efficiency. It may even be advisable to eliminate direct political control by the creation of an advisory body to safeguard the interests of the public. Such action would admittedly be an experiment, as it has not yet been tried with railways elsewhere, but there is no reason to suppose that it would be less successful than the present system.

6. It seems fairly clear that railway construction must not be undertaken for some years to come in Tasmania. But when it is decided to construct a new railway, it is essential that the Railways Commissioner must be consulted. Had this been done in the past, there would have been fewer non-paying lines.
7. The Railway budget should be separated from the general budget of the State, in order to make it easier for the management to plan ahead, and to secure more stability in expenditure in spreading it more evenly over the whole year. But there would not be much advantage in this, unless effect were first given to most of the foregoing suggestions.

37. It is not pretended that these suggestions form any kind of a panacea for the ills of the Tasmanian Railways. It may be that road competition will in a few years be greatly more efficient than it now is, in which case Tasmanian railways would be an easier victim to their inroads than the railways of other Australian States. But it is suggested that as other railways have profited by the improvements outlined, there is an equal chance for improvement in the position of the Tasmanian Railways by their adoption. They have only been sketched in a very general way, and details would have to be worked out carefully. There may also be other avenues for improvement overlooked; if such are to be found they may be discovered by the Mechanical Transport Committee of the Development and Migration Commission, which is now (December, 1928) undertaking a detailed investigation of the Tasmanian Government Railways.



A STUDY IN RAILWAY ECONOMICS.

PART II :

Footnotes, Appendices, and Graphs.

FOOTNOTES TO

SECTION I.

1. J. Russell Smith: Industrial and Commercial Geography, 1925 Ed., P. 756.
 2. See attached map. Description of Tasmanian surface relief will be found in Wood: The Tasmanian Environment, Ch.III; Taylor: Australia physiographic and Economic, P.89; Commonwealth Year Book, No. 20, 1927, P. 86.
 3. Handbook to Tasmania, prepared for the Hobart meeting of the A.A.A.S., 1928, Pp. 116-135.
 4. The figures in the first two lines of the table are taken from the Commonwealth Year Book, No. 20, 1927, and relate to 1926. Those in the third line are corrected by means of figures for territory occupied, Pp. 201 - 5; and those in the fourth line by means of figures for area under crop, Pp. 640 - 1.
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SECTION II.

1. The correspondence is published in Parliamentary Papers, No. 25 of 1889, and No. 39 of 1890.
 2. The whole correspondence concerning the purchase is published in Parliamentary Papers, No. 150 of 1889, and No. 71 of 1890.
 3. Parliamentary Paper, No. 36 of 1900.
 4. The information published is rather scrappy, but the position appears to be as stated.
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SECTION III.

1. Jeans: "Railway Problems", (London, 1887), p. 335.
2. "One remarkable feature of the railway finance of the more important colonies is the ready acquiescence of the inhabitants to tax themselves for transportation facilities." (Jeans: Railway Problems, P. 336.)
3. Commonwealth Year Book, No. 20, Pp. 274 and 286.
4. Op. cit. P. 32.
5. Op. cit. P. 312.
6. Op. cit. P. 337.
7. Acworth: The Elements of Railway Economics, (London, 1924) P. 14.
8. Ripley: Railroads - Finance and Organisation, (New York, 1915), P. 46.
9. Tasmanian Government Railways, General Manager's Report, 1889, P. 7.

SECTION III (Continued).

10. Report for 1890, Page 7.
 11. Annual Report for 1896, Page 5.
 12. See Appendix II.
 13. It is hardly fair to compare it with the two trunk lines, as these must have the benefit of the traffic carried by this line, which is a feeder to both the Main and Western lines.
 14. Report for year ending June 30th, 1915, Page 4.
 15. This expression needs some explanation. The Tasmanian Railways as a whole are not paying, and none of the individual lines is paying full interest on capital, as far as is known. The expression refers to lines which are not paying working expenses. Unfortunately the system of keeping separate accounts for the lines was scrapped in 1912, but figures are taken out from time to time to ascertain the position of individual lines.
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SECTION IV.

1. William Z. Ripley: Railroads - Rates and Regulation, (New York, 1912), Page 55. X
 2. Op. cit. P. 37.
 3. Acworth does not attribute any renewal of sleepers to traffic.
 4. Graph A.
 5. Section III, Paragraph II.
 6. Quoted by J. M. Clark, in the Economics of Overhead Costs, P. 265.
 7. Op. cit. P. 40.
 8. National City Bank of New York Bulletin, February 1928, P. 32. The enquiry concerned the Chicago, Milwaukee and St. Paul Railway Company reorganisation.
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SECTION V.

1. Op. cit. P. 64.
2. Op. cit. P. 66.
3. Published as Parliamentary Papers; No. 25 of 1889, and No. 39 of 1890.
4. Parliamentary Papers, No. 94 of 1889.
5. Parliamentary Papers, 1889, No. 25, Pp. 27 - 28. The Auditor-General states: "...it is not fair to treat these" (new cottages) "as renewals; they are good cottages, and replace the veriest hovels that would have been dear indeed at £10." X

SECTION V (Continued).

6. Parliamentary Papers, 1889, No. 94, P. 62.
 7. "Mercury", September 7th, 1928.
 8. South African Railways and Harbours, Statement of Accounts, 1924/25, P. 30.
 9. In the Annual Report for 1926/27, P. 12, details are given of one such suspense account used for relaying of lines. A statement of rolling stock written off also appears in the same report on P. 37.
 10. Statement of Accounts, op. cit., Pp. 31 and 32.
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SECTION VI.

1. Ripley, op. cit., Chapter II. The table appears on Page 55.
 2. Acworth: The Elements of Railways Economics, Page 55.
 3. Eliot Jones: Principles of Railway Transportation (New York, 1925), P. 77.
 4. South Australia has not been included in the average, as the expenditure appeared abnormally divided. 17½% was spent on the Permanent Way in 1926/27, and 34% in the previous year. In 1926/27, 41% was spent on rolling stock against 35½% the previous year and only 18¾% in 1924/25. In the other States, however, the year 1926/27 was close enough to average to be representative. The S.A. average would be close enough to the Australian average not to affect the result.
 5. John Maurice Clark: The Economics of Overhead Costs, (Chicago, 1923), P. 259.
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SECTION VII.

1. Op, cit, P. 1.
2. The results of the investigation are, quite naturally, considered confidential by the management concerned, and the figures arrived at have therefore not been included here. For the same reason the name of the State and the class of goods concerned have also been kept out.
3. Ripley, op. cit. Chapter VIII.
4. Op. cit. P. 274.
5. Graph E shows the whole trend of these two rates.
6. Taussig: Principles of Economics, Vol. II, Book VII, Chapter 60. (P.372 in 1920 edition).
7. The Australian Tariff: Its Unequal Effect Upon the States, (Hobart, 1928) Appendix I.
8. Ripley, op. cit., P. 160, quoting President Tuttle of the Boston and Maine Railroad Company.

SECTION VII (Continued).

9. See Graph D. Graph E does not show the general Victorian rate, but it amounts to Rate M., which is shown, less 5%. X

SECTION VIII.

1. Hadley: Railroad Transport, P. 116. The case seems to be quoted by almost every writer on railway economics. It will be found in Kirkaldy and Evans: History and Economics of Transport, P. 135, and in Ripley: Rates and Regulation, P. 217. Ripley gives a very sound criticism of Hadley's assumption that the anomaly was justified.
2. Taussig also seems to accept Hadley's viewpoint, although he does not quote the particular case. A discussion will be found in Principles of Economics, Vol. II, Book VII, Chapter 60, Section 5.
3. Ripley, op. cit. P. 223.
4. "The Age", July 28, 1928. Reports also appear in other Melbourne papers of the same dates, but those of "The Age" appear more detailed.
5. "The Age", August 22, 1928.
6. The difference the crossing of a border makes to the B rate is shown in Graph E, where this particular case is depicted.
7. "Manchester Guardian Commercial", January 5, 1928.
8. Queensland Railways, Report of the Commissioner for 1926/27, Table 23, P. 123.
9. Figures given by Mr. Keith Andrews of the Statistical Department, Hobart, "The Mercury", August 29, 1928.
10. Tasmanian Government Railways: Goods Rates Book of June 6th, 1928, Pp. 83 - 85.
11. These reports on the economic, financial and industrial conditions of various countries are issued annually by the Overseas Trade Department.
12. "The traffic taken by the road motor-vehicles is not general average traffic. The railways still retain the bulk traffic, which can only pay low rates. The road carrier confines his activities to the higher grade traffics and passengers." W. T. Stephenson in "The Manchester Guardian Commercial", April 26, 1928.
13. The estimate was prepared for the recent Royal Commission on the Victorian Railways by the Railways Commissioners. It is not yet published, but will of course be published if the Commission decides to publish evidence.
14. "The Manchester Guardian Commercial", January 5, 1928.
15. Op. cit., Chapter VI.

SECTION X.

1. Sir Lennon Raws: Australian Loan Expenditure, (Economic Record, November, 1928).
 2. C. E. R. Sherrington: The Economics of Rail Transport in Great Britain, (London, 1928), Vol. II. P. 308.
 3. W. Z. Ripley: Railroads - Finance and Organisation, Chapter XII. X
 4. 1926/27 Report, P. 49.
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SECTION XI.

1. Manchester Guardian Commercial, September 6, 1928.
 2. Op. cit., Vol. II, P. 299.
 3. "The Economist", June 2, 1928, P. 1124.
 4. G. K. Fenelon: The Economics of Road Transport (London, 1925), P. 241.
 5. See Section VII, Paragraph 54.
 6. Thirty-Sixth General Report, (Parliamentary Paper, No. 7834 of 1926), P. 6.
 7. Queensland Annual Report, P. 19; Western Australian Annual Report, P. 17.
 8. The report has not been published, and is for some unknown reason regarded as confidential, but excellent summaries of parts of it may be found in two reports by the Victorian Parliamentary Standing Committee on Railways, namely:- Report on the Proposed Malley Extension (Parliamentary Paper No. 17803 of 1927) Pp. 8 - 13, and Thirty-Eighth General Report (Parliamentary Paper, No. 6645 of 1928), P. 6.
 9. "The Age", May 11, 1928.
 10. Report on the Economic and Financial Situation of Egypt, May 1928, P. 39.
 11. Thirty-Eighth Report of the Victorian Railways Standing Committee, P. 6.
 12. House of Lords Hansard, Vol. 71, No. 62, P. 1173.
 13. "The Economist", September 15, 1928, P. 466.
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SECTION XII.

1. Pigou stresses the importance of this point. See Economics of Welfare, Chapter XXI, Section 2.
2. Sir Sydney Chapman: Outline of Pol. Economy, P. 368.
3. A. C. Pigou: Economics of Welfare, Part II, Chapter XI Section 5. (P. 302 of 1924 Ed.)
4. Op. Cit. P. 352.
5. Alfred Marshall: Industry and Trade. Book III

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4. Op. Cit. P. 352.
5. Alfred Marshall: Industry and Trade, Book III, Chapter VI, Section 3, P. 495 of 1919 Ed.).

SECTION XII (Continued).

6. Sir William Acworth in an address delivered to the Royal Economic Society in 1912. Quoted by Marshall, Op.cit. P. 494.
 7. The statement was made in an address on Railway Nationalisation before the Royal Economic Society in 1908, Marshall, op.cit., P. 494.
 8. Pigou, op. cit., p. 353. Pigou contends that this is a real advantage, and not a bounty obtained at the expense of the engineer or manager, for there is created a new value in extra satisfaction.
 9. Sherrington, op. cit., Vol. II, P. 304.
 10. Marshall, op. cit., Footnote to P. 494.
 11. David Houston: Memorandum on Rationalisation in the United States, published by the Economic and Financial Section of the League of Nations.
 12. Chapman, op.cit., P. 368. He says that "If all the electric ~~trams~~ were run by local authorities, competition would still rule in the electrical industry which provided them with their plant.
 13. Industry and Trade, P. 493.
 14. Principles of Economics, Book IV, Chapter XIII, Section 9. (P. 304 of Fifth Edition), 1907.
 15. Pigou, op. cit., P. 362.
 16. Pigou, op. cit., P. 357.
 17. Ripley: Railroads - Rates and Regulation, Chapter VI.,
 18. The evidence has not been published, but typewritten copies of the evidence referred to have been made available by the Victorian Railways Department.
 19. "The Age", June 30th, 1928.
 20. New South Wales Parliamentary Paper No. 28910 - 167 of 1924, P. XXXII.
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SECTION XIII.

1. The private railways "open for special purposes", such as the sugar trams of Queensland and the timber trams of Tasmania and Western Australia, must be excluded from this general statement. But substantially the same applies to them; they have been built to fill a want rather than to create one.
 2. Ripley: Railroads: Finance and Organization, p. 377.
 3. Report of Committee on Indian Railways, Cmd.1512 of 1921, p.22
 4. Report of Royal Commission on New South Wales Railways, 1924, p. xxii.
 5. "The Age", May 19, 1928.
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APPENDIX I.RAILWAY MILEAGE COMPARED TO VALUE OF PRODUCTION.

Since railways are principally concerned with the carriage of goods, it is to be expected that railway mileage should have some relation to total production, as total production will provide a measure of potential railway revenue. It seems best to compare railway mileage to total value of production rather than the physical volume, as the value of a product has a definite influence on railway freight rates.

Figures for value of production are, however, not easily obtained. They are published in the bulletin on Production and Trade issued by the Commonwealth Bureau of Census and Statistics, but are not at all complete, and the figures published are not completely satisfactory. The following figures are taken:

Value of Production, 1925/26 (£ mill.).

	<u>N.S.W.</u>	<u>Vic.</u>	<u>Q'ld.</u>	<u>S.A.</u>	<u>W.A.</u>	<u>Tas.</u>
Agricultural (Value of Crops)	25.50	22.50	12.50	15.50	10.00	3.50
Dairying, Bees, etc.	16.00	17.00	8.00	3.33	1.33	1.33
Manufacturing (Added Value).	65.00	48.00	17.00	13.00	10.00	3.50
Mining	16.50	1.00	2.00	1.00	2.33	1.50
Pastoral.	52.00	13.00	30.00	6.00	7.00	1.67
<u>Total</u>	175.00	101.50	70.00	39.00	31.00	10.50

These figures do not include all production, Timber, for instance, is left out because no satisfactory figures are available, and if included would raise the Western Australian and Tasmanian figures in proportion to the rest.

Applying these figures to the mileage of railways in the various States, the following result is obtained:-

	<u>N.S.W.</u>	<u>Vic.</u>	<u>Q'ld.</u>	<u>S.A.</u>	<u>W.A.</u>	<u>Tas.</u>	<u>Aust.</u>
Total pro- duction (£m).	175	101	70	39	31	10.5	426.5
Mileage of Railways.	6,072	4,688	7,576	3,624	5,202	1,072	28,234
Production per mile of railway, £	22,800	21,540	9,270	10,763	5,961	9,794	15,100
Miles of railway per £m. of pro- duction	34.7	46.4	108.2	92.9	167.8	102.1	66.2

APPENDIX NO. II.TABLE I.Results of Working of Three Tasmanian Lines, 1891 - 1912.

Year.	<u>Zeehan-Strahan</u>		<u>Derwent Valley</u>		<u>Sorell</u>	
	Profit.	Loss.	Profit	Loss.	Profit	Loss.
	£		£		£	
1891	-	-	-	977	-	-
1892	5,900	-	-	906	-	950
1893	10,783	-	-	1,618	-	1,207
1894	13,638	-	-	680	-	836
1895	12,527	-	-	766	-	937
1896	16,896	-	-	131	-	955
1897	18,552	-	-	966	-	680
1898	15,980	-	-	630	-	581
1899	10,014	-	-	533	-	312
1900	11,015	-	-	786	-	628
1901	3,428	-	-	262	-	836
1902	1,406	-	1,122	-	30	-
1903	1,703	-	-	873	-	299
1904/05	2,065	-	1,669	-	-	283
1905/06	5,280	-	256	-	-	683
1906/07	2,992	-	975	-	-	615
1907/08	-	580	1,425	-	-	146
1908/09	-	374	1,781	-	-	372
1909/10	-	2,344	892	-	-	129
1910/11	-	8,235	455	-	-	442
1911/12	-	3,245	2,078	-	-	58.

TABLE II.Loss on Three Tasmanian Branch Lines, 1891 - 1912.

Year.	<u>Chudleigh.</u>		<u>Apsley</u>		<u>Parattah -Oatlands</u>	
	Revenue £	Loss. £	Revenue £	Loss £	Revenue £	Loss £
1891	-	-	3,093	1,640	534	954
1892	-	-	2,776	2,720	461	751
1893	451	1,103	2,255	1,902	786	361
1894	383	868	1,976	1,182	396	428
1895	553	776	2,145	870	278	225
1896	599	626	2,239	827	162	353
1897	557	680	2,167	987	138	399
1898	568	839	2,232	1,113	127	336
1899	714	783	2,565	987	162	373
1900	722	983	2,631	1,004	159	442
1901	847	790	3,075	2,532	190	429
1902	957	783	3,732	1,654	230	475
1903	1,235	501	3,984	1,787	238	399
1904/05	1,090	535	4,091	1,398	261	464
1905/06	1,004	639	4,025	2,142	272	353
1906/07	1,045	720	4,205	1,756	280	322
1907/08	1,131	634	4,279	2,056	273	352
1908/09	1,176	647	4,434	1,221	255	456
1909/10	1,057	950	4,659	1,529	271	513
1910/11	1,050	693	4,907	1,817	275	396
1911/12	1,136	671	5,698	810	275	499
		4121	6	31,934		

Separate accounts for branch lines were kept up to June 30th, 1912, but were then abandoned on account of the high cost associated with the work. The position of these lines for the last 16 years is therefore unknown, except for an investigation made for 1927/28. Particulars of the investigation are given in Section X, Sub-section (g).

TABLE III.

Analysis of Working Expenses on Tasmanian Railways
for the 10 years 1917/18 - 1926/27.

<u>Year.</u>	<u>Maintenance of Way.</u>	<u>Traffic Expenses.</u>	<u>Locomotive Power.</u>	<u>Rolling Stock Maintenance.</u>
	£	£	£	£
1917/18	72,515	63,728	77,023	48,167
1918/19	87,902	72,514	89,966	59,294
1919/20	100,276	87,786	114,480	81,096
1920/21	122,349	109,521	148,929	80,225
1921/22	152,168	125,038	155,655	80,991
1922/23	144,973	117,607	145,545	80,618
1923/24	151,186	122,395	145,905	86,888
1924/25	144,612	122,347	143,273	78,311
1925/26	134,835	117,246	145,826	70,666
1926/27	134,291	118,986	148,987	71,744
Percentage of Total for 10 years.	27.03%	22.97%	28.56%	15.16%

General administration expenses (3 per cent.) and a number of small items varying in description from year to year, and amounting to 3.24 per cent., have not been included in the table. The latter include such items as retiring allowances, and gratuities, compensation for accidents, etc.

APPENDIX IV.TABLE I.Maintenance of Way Expenditure Compared to Total Expenditure.Earnings, Train Miles Run, and Length of Line Open.

<u>Year Ended</u> <u>June 30th.</u>	<u>Maintenance</u> <u>Expenditure</u> £	<u>Percentage of</u> <u>Total Expenses.</u> %	<u>Percentage</u> <u>of Earnings</u> %	<u>Per Train</u> <u>Mile</u> d.	<u>Per Average</u> <u>Mile Open</u> £
1921.	122,349	25.52	20.25	21.02	190.76
1922.	152,168	28.28	25.87	25.48	239.73
1923.	144,937	28.19	25.32	24.25	218.50
1924.	151,186	27.48	25.82	25.62	226.41
1925.	144,612	27.20	26.37	25.14	214.87
1926.	134,835	26.75	24.73	23.83	200.35
1927.	134,291	27.92	24.90	24.46	204.01
Average for seven years	£140,625	27.40%	24.75%	24.26d.	£213.52.

TABLE II.

Traffic Expenditure Compared to Total Expenditure,
Earnings, Train Miles Run, and Length of
Line Open.

<u>Year Ended</u> <u>June 30th.</u>	<u>Traffic Ex-</u> <u>penditure.</u> £	<u>Percentage of</u> <u>Total Expenses.</u> %	<u>Percentage</u> <u>of Earnings.</u> %	<u>Per Train</u> <u>Mile</u> d.	<u>Per Average</u> <u>Mile Open</u> £
1921	108,774	22.84	18.12	18.82	170.76
1922	125,038	23.24	21.26	20.94	196.99
1923	117,607	22.87	20.54	19.67	177.25
1924	122,395	22.25	20.91	20.74	183.29
1925	122,347	23.02	22.32	21.28	181.83
1926	117,246	23.26	21.50	20.72	174.21
1927	118,987	23.86	22.06	21.67	180.77
Average for seven years.	£118,913	23.05%	20.96%	20.55d.	£180.73.

TABLE III.

Haulage Expenditure, (Locomotive Power) Compared to Total Expenditure, Earnings, Train Miles Run, and Length of Line.

<u>Year Ended June 30.</u>	<u>Haulage Expenditure.</u>	<u>Percentage of Total Expenses.</u>	<u>Percentage of Earnings.</u>	<u>Per Train Mile.</u>	<u>Per Average Mile Open</u>
	£	%	%	d.	£
1921.	148,929	31.28	24.82	25.61	236.58
1922.	155,655	28.93	26.45	26.07	245.22
1923.	145,545	28.29	25.43	24.34	219.36
1924.	145,905	26.52	24.92	24.73	218.50
1925.	143,237	26.95	26.14	24.91	212.89
1926.	145,826	28.93	26.76	25.77	216.68
1927.	148,987	29.87	27.62	27.13	226.34
Average for seven years.	£148,012	28.97%	26.02%	25.51d.	£225.07.

TABLE IV.

Expenditure on Maintenance of Rolling Stock compared to Total Expenditure, Earnings, Train Miles Run, and Length of Line.

<u>Year ended June 30th.</u>	<u>Haulage Expenditure.</u>	<u>Percentage of Total Expenses</u>	<u>Percentage of Earnings.</u>	<u>Per Train Mile.</u>	<u>Per Average Mile Open</u>
	£	%	%	d.	£.
1921.	78,861	16.56	13.14	14.79	121.02
1922.	83,503	15.52	14.20	13.98	131.55
1923.	82,763	16.09	14.47	13.56	124.73
1924.	88,657	16.11	15.14	15.02	132.77
1925.	80,029	15.05	14.59	13.92	118.91
1926.	72,500	14.38	13.30	12.82	107.73
1927.	73,590	14.36	13.62	13.39	111.64
Average for seven years.	£82,843	15.44%	14.06%	13.92d.	£121.19

In calculating proportions of total expenditure for 1927, in all tables, the item £52,500 for depreciation has been excluded as this is the only year in which this item has occurred. This also applies to the average for 10 years.

APPENDIX NO. V.EMU BAY RAILWAY.Statement of Gross Earnings and Working Expenses of the Emu Bay Railway Company, 1901 - 1927.

<u>Year.</u>	<u>Gross Earnings.</u> £	<u>Maintenance of Way.</u> £	<u>Loco. Power & Rolling Stock.</u> £	<u>Traffic Costs.</u> £
1901.	39,004	8,655	8,734	3,144
1902.	42,131	7,354	9,151	3,005
1903.	40,818	6,945	7,595	2,828
1904.	42,365	8,205	8,382	2,885
1905.	50,829	8,098	6,930	3,016
1906.	60,170	10,189	7,771	3,702
1907.	65,658	10,670	10,123	4,128
1908.	57,057	11,133	9,879	4,227
1909.	58,533	9,594	9,274	4,130
1910.	59,229	9,563	9,459	3,967
1911.	60,761	8,757	11,380	4,263
1912.	66,400	8,093	11,812	4,819
1913.	67,385	9,637	10,472	6,057
1914.	47,749	11,776	9,051	4,847
1915.	39,263	8,035	8,068	2,629
1916.	48,785	9,565	5,321	3,809
1917.	47,525	14,201	8,605	3,827
1918.	58,457	14,298	13,719	4,634
1919.	50,501	15,008	9,517	4,776
1920.	67,845	15,430	14,574	6,465
1921.	52,966	14,431	13,753	6,156
1922.	55,250	14,090	14,284	5,758
1923.	55,951	14,230	12,599	5,295
1924.	59,953	10,966	14,571	5,675
1925.	65,928	17,062	16,610	6,086
1926.	69,262	16,553	19,242	6,576
1927.	71,570	15,579	20,595	6,891

APPENDIX NO. VI.MOUNT LYELL RAILWAY.Statement of Gross Earnings and Expenditure
of the Mount Lyell Railway, 1913 - 1927.

<u>Year.</u>	<u>Total</u> <u>Earnings.</u>	<u>Perm. Way</u> <u>Maintenance.</u>	<u>Loco. Rol-</u> <u>ling Stock</u> <u>Repairs.</u>	<u>Traffic</u> <u>Expendi-</u> <u>ture.</u>	<u>Total</u> <u>Expendi-</u> <u>ture.</u>
	£	£	£	£	£
1913.	45,991	9,248	7,833	6,144	23,225
1914.	59,279	6,205	8,912	7,081	22,198
1915.	46,788	6,210	7,486	6,271	19,967
1916.	44,749	7,158	7,062	8,402	22,622
1917.	40,980	9,361	8,874	7,266	25,501
1918.	34,209	13,418	8,847	5,932	28,197
1919.	24,570	9,988	8,824	5,865	24,677
1920.	26,883	8,309	8,148	7,498	23,955
1921.	24,020	6,624	11,493	6,063	24,180
1922.	24,403	5,939	10,050	5,781	21,770
1923.	27,202	6,865	9,609	5,672	22,146
1924.	22,628	7,145	4,647	13,756	25,548
1925.	26,475	6,572	4,244	13,366	24,182
1926.	25,266	7,568	5,554	14,592	27,714
1927.	28,750	6,184	5,356	14,188	25,728

These figures are not completely satisfactory, as the railway is only incidental to the mining operations of the company (The Mt. Lyell Mining and Railway Co., Limited). Most of the freight carried consists of coal and raw materials from Strahan to Queenstown, and copper from Queenstown to Strahan.

APPENDIX NO. VII.

Table showing working costs of Tasmanian Government Railways per train mile, analysed into the four main divisions of expenditure. 1901 - 1926/27.

Year.	<u>Total</u> <u>Expendi-</u> <u>ture.</u>	<u>Main-</u> <u>tenance</u> <u>of Way.</u>	<u>Traffic</u> <u>Expen-</u> <u>diture.</u>	<u>Loco-</u> <u>motive</u> <u>Power.</u>	<u>Rolling</u> <u>Stock.</u>	<u>Train</u> <u>Miles</u> <u>Run.</u>
	d.	d.	d.			Miles
1901.	46.46	16.10	11.00			895,682
1902.	46.06	15.60	11.20	17.00		902,918
1903.	42.85	13.40	11.00	16.90		931,716
1904/5.	43.54	13.90	11.10	16.00		945,852
1905/6.	43.79	13.50	11.30	16.10		945,918
1906/7.	45.36	14.00	11.20	16.70		
1907/8.	47.11	14.50	11.60	17.90		981,379
1908/9.	47.60	14.50	12.00	18.80		1,028,030
1909/0.	47.93	14.50	11.80	18.80		1,029,119
1910/1.	49.68	15.14	12.34	19.30		1,059,790
				19.43		1,041,051
1911/2.	50.72	14.42	12.93			
1912/3.	51.82	14.07	14.50	19.78		1,046,479
1913/4.	53.41	13.83	13.84	20.75		1,006,508
1914/5.	53.96	13.90	13.80	13.66	9.52	1,000,740
1915/6.	56.23	15.20	13.36	14.23	9.60	1,005,145
				14.94	9.61	1,051,511
1916/7.	64.23	18.34	14.27			
1917/8.	63.14	16.47	14.47	17.02	10.94	1,080,459
1918/9.	70.31	19.04	15.70	17.49	10.95	1,056,373
1919/0.	73.93	19.00	16.63	19.48	12.85	1,107,890
1920/1.	82.37	21.02	18.82	21.68	13.48	1,266,825
				25.61	14.79	1,387,417
1921/2.	90.10	25.48	20.94			
1922/3.	86.03	24.25	19.67	26.07	13.98	1,433,099
1923/4.	93.69	25.62	20.74	24.34	13.56	1,434,876
1924/5.	93.42	25.14	21.28	24.73	15.02	1,416,216
1925/6.	89.07	23.83	20.72	24.91	13.92	1,380,405
				25.77	12.82	1,358,011
1926/7.	90.82	24.45	21.67	27.13	13.39	1,317,727

Separate figures for Locomotive Power and Rolling Stock Maintenance are not available for the years before 1913/14. The few figures following suggest that Locomotive about Power absorbs 60 per cent. of the combined figure, but later figures reduce this in some cases below 50 per cent. In the circumstances it seems too difficult to get a satisfactory partition of the figures for the early years.

APPENDIX VIII.

Table showing working costs of Tasmanian Government Railways per train mile, (see previous table, Appendix VII) converted to 1911 prices.

<u>Year.</u>	<u>Retail Price Index.</u>	<u>Total Expenditure.</u>	<u>Maintenance of Way.</u>	<u>Traffic.</u>	<u>Locomotive Power.</u>	<u>Rolling Stock Main'ce.</u>
		d.	d.	d.		d.
1911/12	937	54.14	15.39	13.80		21.11
1912/13	1,033	50.16	13.52	14.04		20.09
1913/14	1,019	52.41	13.57	13.58	13.34	9.34
1914/15	1,095	49.28	12.69	12.60	13.00	8.95
1915/16	1,269	44.31	11.98	10.53	11.77	7.80
1916/17	1,230	52.22	14.91	11.60	13.84	8.90
1917/18	1,300	48.54	12.67	11.13	13.45	8.42
1918/19	1,346	52.16	14.14	11.66	14.40	9.55
1919/20	1,556	47.51	12.21	10.69	13.94	8.66
1920/21	1,788	46.06	11.75	10.05	14.32	8.27
1921/22	1,586	56.81	16.06	13.20	17.06	8.81
1922/23	1,613	53.33	15.03	12.19	15.09	8.40
1923/24	1,742	53.78	14.71	11.90	14.20	8.61
1924/25	1,706	54.11	14.73	12.47	14.60	8.16
1925/26	1,710	52.09	13.94	12.11	15.07	7.50
1926/27	1,689	53.18	12.83	12.83	16.06	7.91

APPENDIX NO. IX.Maintenance of Way, Rolling Stock, and Traffic Expenditure
compared with Total Earnings, 1891/1927.

<u>Year.</u>	<u>Total</u> <u>Earnings.</u> £	<u>Maintenance of</u> <u>Way.</u> £	<u>Rolling Stock.</u> £	<u>Repairs.</u> £
1891.	169,050	53,058	54,100	33,549
1892.	176,926	61,641	55,276	37,110
1893.	152,083	50,191	48,623	31,152
1894.	144,487	44,762	42,482	29,507
1895.	149,642	46,547	38,381	29,423
1896.	162,932	46,812	38,326	30,908
1897.	166,833	48,561	40,682	32,989
1898.	178,180	54,927	45,179	33,764
1899.	193,158	56,237	51,662	37,370
1900.	202,959	58,862	53,865	39,299
1901.	205,790	59,897	63,580	41,137
1902.	233,210	58,612	63,792	42,416
1903.	247,683	51,734	62,288	42,771
1904/05.	243,556	54,237	63,372	43,574
1905/06.	241,188	53,416	65,831	44,585
1906/07.	258,223	57,464	73,134	45,883
1907/08.	277,606	62,075	80,661	49,697
1908/09.	280,036	62,171	80,836	51,292
1909/10.	284,063	64,168	85,435	51,899
1910/11.	277,916	65,774	84,787	54,254
1911/12.	312,785	63,669	88,254	57,570
1912/13.	327,113	58,534	86,300	60,620
1913/14.	330,168	57,685	96,676	57,731
1914/15.	323,265	58,253	99,829	57,814
1915/16.	348,028	66,618	108,877	64,247
1916/17.	340,505	82,571	125,889	58,571
1917/18.	356,735	72,515	119,259	63,728
1918/19.	401,364	87,902	112,653	72,514
1919/20.	506,177	100,276	178,099	87,786
1920/21.	600,045	122,349	219,812	109,521
1921/22.	588,066	152,168	236,646	125,038
1922/23.	572,417	144,973	225,163	117,607
1923/24.	585,468	151,186	232,973	122,395
1924/25.	548,256	144,612	221,584	122,347
1925/26.	545,191	134,835	216,492	117,246
1926/27.	539,352	134,291	220,731	118,986.

APPENDIX NO. X.TABLE I.

Maintenance of Way Expenditure compared to Gross Revenue.
Index Numbers - 1891 = 1,000.

<u>Year.</u>	<u>Gross Earnings.</u>		<u>Maintenance of Way.</u>	
	<u>Actual</u>	<u>Index.</u>	<u>Actual.</u>	<u>Index.</u>
	<u>£</u>		<u>£</u>	
1891.	169,050	1,000	53,858	1,000
1892.	176,926	1,045	61,641	1,143
1893.	152,083	900	50,191	931
1894.	144,487	855	44,762	831
1895.	149,642	865	46,547	863
1896.	162,932	964	46,812	868
1897.	166,833	984	48,561	901
1898.	178,180	1,054	54,927	1,019
1899.	193,158	1,143	56,237	1,043
1900.	202,959	1,200	58,862	1,092
1901.	205,790	1,218	59,897	1,111
1902.	233,210	1,379	58,612	1,087
1903.	247,683	1,465	51,734	959
1904.05.	243,556	1,441	54,237	1,006
1905.06.	241,188	1,427	53,416	991
1906.07.	258,223	1,528	57,464	1,066
1907.08.	277,606	1,642	62,075	1,151
1908.09.	280,036	1,657	62,171	1,153
1909.10.	284,063	1,680	64,168	1,191
1910.11.	277,916	1,644	65,774	1,220
1911.12.	312,785	1,849	63,669	1,162
1912.13.	327,113	1,935	58,534	1,068
1913.14.	330,168	1,948	57,685	1,070
1914.15.	323,265	1,913	58,253	1,081
1915.16.	348,028	2,059	66,618	1,236
1916.17.	340,505	2,015	82,571	1,532
1917.18.	356,735	2,110	72,515	1,345
1918.19.	401,364	2,375	87,902	1,633
1919.20.	506,177	2,995	100,276	1,860
1920.21.	600,045	3,550	122,349	2,270
1921.22.	588,066	3,479	152,168	2,823
1922.23.	572,417	3,387	144,973	2,689
1923.24.	585,468	3,463	151,186	2,805
1924.25.	548,256	3,244	144,612	2,683
1925.26.	545,191	3,226	134,835	2,502
1926.27.	539,352	3,191	134,291	2,491

TABLE II.

Earnings, Maintenance of Way, and Maintenance
of Rolling Stock, Index Numbers, (1914 = 1,000).

<u>Year ended June 30.</u>	<u>Earnings.</u>		<u>Maintenance.</u>		<u>Rolling Stock.</u>	
	<u>Actual.</u>	<u>Index.</u>	<u>Actual.</u>	<u>Index.</u>	<u>Actual.</u>	<u>Index.</u>
1914.	330,168	1,000	57,685	1,000	39,694	1,000
1915.	323,265	979	58,253	1,009	40,210	1,013
1916.	348,028	1,050	66,618	1,154	43,429	1,094
1917.	340,505	1,031	82,571	1,430	49,277	1,241
1918.	356,735	1,080	72,515	1,256	48,167	1,213
1919.	401,364	1,212	87,902	1,524	59,294	1,493
1920.	506,177	1,533	100,276	1,737	81,096	2,042
1921.	600,045	1,817	122,349	2,120	80,225	2,021
1922.	588,066	1,781	152,168	2,637	80,991	2,040
1923.	572,417	1,733	144,973	2,512	80,618	2,030
1924.	585,468	1,773	157,186	2,620	86,888	2,188
1925.	548,256	1,660	144,612	2,506	78,311	1,972
1926.	545,191	1,651	134,835	2,337	70,666	1,780
1927.	539,352	1,633	134,291	2,327	71,744	1,807.

APPENDIX XI.WAGES IN RAILWAY EXPENDITURE.

In Paragraph 16 of Section IV on railway expenditure the statement was made that wages form by far the largest part of railway expenditure, but no proof of this assertion was made. There are, in fact, no figures published in the ordinary annual reports of Australian railways showing the proportion of wages to total costs, although the figures that are given (see Paragraphs 5, 36, and 39 of Section IV) indicate that the proportion is high.

But the Western Australian Government Railways in their 1926/27 Annual Report set out in the form of a calendar the railway expenditure of the year, and a summary puts the position as follows:-

"Out of the earnings of an entire year it took the receipts of:-
 197 days to pay wages and salaries;
 28 days to provide locomotive fuel;
 30 days to provide other materials and stores;
 10 days to pay sundry expenses;
 7 days set apart for relaying tracks and replacements;
 90 days to meet interest charges on capital, leaving
 3 days to be retained by the State Treasury as profits."

This year the Victorian Railways have followed their example, and have published in the Victorian Railways Magazine for November 1928 (P.15) a similar calendar, showing that out of the gross revenue for 1927/28 it took the receipts of 213 days to pay wages and salaries, of 27 days to buy coal, of 46 days to meet other working expenses, and of 95 days to pay interest charges. This, if added up, makes 380 days, and as there are only 365 in a year, it shows that the deficit equalled the takings of 15 days.

One may from this calculate roughly the proportion of wages to total working expenditure (excluding interest payments and profits) in the two States, and this is shown in the following table:-

Expenditure on:	Western Australia	Victoria
	%	%
Wages	72.5	74.5
Coal	10.2	9.4
Other materials and supplies ...	11.0	} 16.1
Sundry expenses	3.7	
Relaying and replacements	2.6	
<hr/>		
Total working expenses	100.	100.
<hr/>		

The percentage of expenditure spent on coal is lower in Victoria on account of the fact that the Western Australian figure is for all fuel and also because of the length of electrified line in Victoria. The expenditure on electric power is included in "other working expenses". One should also expect the Victorian figure for wages to be lower than the West Australian for this reason, as electric train working requires less labour than steam working, but there are other factors which possibly make for the different result. The larger the railway system, the greater the amount of manufacture of railway material is done by the railways themselves. The Victorian Railways probably manufacture a great deal more of their own rolling stock and other equipment than the Western Australian Railways. This will make the Victorian wages bill higher in proportion and the expenditure on material and supplies smaller in proportion. The Victorian Railways Commissioners made use of the fact that the wages bill is so high in answering a question put by the Royal Commission concerning the causes of losses in working. Comparing the year 1918/19 with the year 1926/27, there is an increase in working expenditure totalling a little over £7mill. This is divided into extra expenditure due to new activities, expansion of business and higher standards of maintenance, and causes beyond the control of the management. The latter category accounts for £3.5mill., and of this roughly £2.5mill. went to pay higher rates of wages and the wages of additional staff, higher wages accounting for nearly all of it (£2.4mill.).

This opens an important question of railway economics, which has not been touched upon in this thesis. The question of wage regulation and labour relations generally is of much more importance to railway managements than to the average employer, whose wages bill does not form such a big proportion of his total costs.

APPENDIX XII.ACCUMULATED DEFICITS OF AUSTRALIAN STATE RAILWAYS.

In the article quoted in Paragraph 2 of Section IX, Sir Lennon Raws gives the following information concerning deficits on Australian State-owned Railways:-

	Deficit for Year Ended June 30, 1927 £	Accumulated Deficit. £
Commonwealth	413,601	4,006,675
New South Wales	637,176	2,650,928
Victoria	435,302	4,593,366
Queensland	1,964,365	23,948,925
South Australia	1,193,062	7,061,430
Western Australia	124,199	188,822
Tasmania	297,095	4,946,311

He adds these up to show that the total deficit on all Australian railways for last year was £5,064,800, and the accumulated deficit £43,908,065, but a moment's reflection will show that the figures have not sufficient in common to be added together at all.

The figures for the deficits of last year may have enough in common to be added together, but even they show differences. The Queensland figure excluded £93,070 interest capitalised, and the South Australian excluded £2,020,836 deferred charges for depreciation. On the other hand the Western Australian figure includes evidently £126,000 payment towards sinking fund, the Tasmanian £52,500 depreciation charges and £16,115 for deferred renewals (repayments from the year's revenue to suspense accounts). Apart from this the methods of book-keeping differ. For Victoria and Western Australia, for instance, Sir Lennon has taken Treasury figures. While his Victorian figures show a deficit of £435,302, the Railways' Annual Report shows only £47,540, or, if the amount received from the Treasury to cover loss on non-paying lines be included, £234,382. The Western Australian Railways' Annual Report shown instead of the deficit in the table a surplus of £34,556. The reason for the differences in the two latter States is that the Treasury publishes a cash account, whereas the railways include

receipts and expenditure due, but not paid. It seems futile to add figures of such widely different character.

The figures of the second column have less in common, as the deficits are not the complete accumulated deficits in all cases. Complete figures are shown for Tasmania, Western Australia, South Australia and the Commonwealth, but not for the other States. The New South Wales figure goes back to 1914/15, and if one went back another ten years there would be an accumulated surplus of £1,276,979. The Victorian goes back to the same year, and the Queensland figure to 1887.

But as pointed out in Paragraph 3 of Section IX, even apart from this the figures are not comparable in so far as they include varying contributions towards renewals and depreciation. The Western Australian Railways, as shown in Paragraph 20 of Section V, have made a considerable contribution from revenue for capital purposes. The figures given in that section differ somewhat from the figures of Sir Lennon Raws, in that they are Railway figures, and his evidently taken from Treasury statements. On the other hand the Victorian Railways have an estimated surplus capital of £16mill. and the New South Wales Railways £7.3mill., which may be said to be accumulated depreciation, not written off. Tasmanian railway capital is in a worse position, but no reliable estimate is available. (See Section IX, Sub-Sections (e) and (f)).

APPENDIX XIII.A RAILWAYS ADVISORY BOARD.

In Paragraphs 19 and 20 of Section XIII a suggestion was made for a Railways Advisory Board, with the object of safeguarding the public interests and at the same time obviating the difficulties associated with political pressure acting through the Minister in control. It may be worth while to examine this proposal a little more closely.

It is clear that the management of the Railways must be vested in the Commissioner, or where there is more than one Commissioner in the Chief Commissioner. This is done now, but the Ministers for Railways in the various States have some power of intervening in the management, which is, generally speaking, detrimental to the efficient working of the Railways. At the same time the management of a public utility of the magnitude of a railway system requires supervision from the public point of view; this supervision or control is exercised in countries where the railways are managed by private enterprise, and will be equally necessary in the case of State Railways.

The constitution of such a Board should not be difficult. Such boards are now common in connection with central banks, and possibly the Commonwealth Bank Board of Directors might serve as a model. This Board consists of the Governor of the Bank, the Secretary to the Treasury, and six persons "who are, or have been, actively engaged in agriculture, commerce, finance or industry". ^(Excludes rep. from Melb. Trades Hall) There is a similar board of five commissioners governing the Melbourne Harbour Trust. The Chairman only devotes his whole time to the business of the Trust, while the other four are representatives respectively of the interests of the shipowners, exporters, importers and primary producers. All are appointed by the Governor-in-Council.

A Railway Board for Tasmania on the same lines might consist of the Commissioner of Railways and representatives of the chief

classes of railway users, i.e., manufacturers, primary producers, and merchants. But as in the case of the Commonwealth Bank Act, which excludes directors and officers of other banks, there would have to be a provision that no one engaged in the business of transport, whether shipping, road or rail transport, must have a seat on the Board. To secure liaison with the administrative departments of government an officer of the Treasury and an officer of the Chief Secretary's Department might be added; the Treasury officer for the purpose of giving financial advice, and the other to represent the government of the day. The Board would, of course, be further strengthened by the appointment of a competent economist. These should be given a long term of office and be eligible for re-appointment.

The duties of such a Board would be more difficult to define. It must be kept in mind that this Board should take the place of the Minister in the control of the Railways, and must not curtail the powers of the Commissioner. The Railways Commissioner must have full power in the detailed working of the Railways, and the Board should only have power on broad matters of policy. It would be necessary to define these as closely as possible, to avoid the mistakes of a dragnet clause of the nature of Section 101 of the Victorian Railways Act, mentioned in Paragraphs 16 and 17 of Section XIII. It is impossible to define what is detail and what is general policy so closely as to eliminate disputes, but the success of the scheme would in any case be dependent on co-operation and confidence as between the Commissioner and the Board.

Some of the powers, which such a Board might be given, may be outlined as follows:-

1. The Board should, together with the Commissioner, be charged with the duty of investigating and reporting on any new line or any other loan expenditure, before it is sanctioned by Parliament. This would be quite apart from any other investigation which Parliament might itself desire to make, by means of a Select Committee or otherwise. But it should be obligatory on the part of such Committee to give full attention to the views of the Board in its report.

2. The audit and inspection of accounts should be a duty of the Board, but care would have to be taken to see that there would be no overlapping with the Auditor-General's Department. The Commissioner would be required to make periodical statements of the finances to the Board.
3. The Board would have power to make regulations and by-laws, but it may be necessary that if such regulations or by-laws are made without the concurrence of the Commissioner, the Board should be required to minute its reasons for its action and the Commissioner be given the right to make a minute of his objections. This latter provision might be made to apply to all disagreements.
4. The Board should have power to close lines the operation of which is so unprofitable as to be definitely a danger to sound finance. The Government would require a voice in this matter, but might be required to subsidise the Railways to the extent of the loss to make its voice effective. The same might apply to new lines constructed against the judgment of the Board.
5. The making of contracts for the supply of material should be the responsibility of the Board, but an exception might be made of small contracts, which could be left to the Commissioner. Definition of "small" could be made by setting a limit to the expenditure the Commissioner might make on his own account.
6. The Board should also be consulted in the creation of rates and fares of a discriminatory nature, such as rates favouring certain districts or subsidising local manufactures. In this connection the representation of various business interests is of importance.
7. If preference is given to Australian manufactures in tenders for supplies, that is a political matter and the limits of preference must be decided by the government of the day. But the Board should have power, on the recommendation of the Commissioner, to depart from the preference limit, minuting its reasons for doing so. This may be necessary in cases such as that mentioned in Paragraph 44 of Section XI, where differences in quality preclude accurate comparisons of prices.
8. In view of the importance of employment relations in an industry with a relatively large number of employees, the Board should have advisory power in determining general policy. Details of a workable scheme, with adequate provision for consulting representatives of employees, will not be dealt with, as no consideration has been given to employment relations in the text.
9. In cases of disagreement on interpretation of general policy between the Commissioner and the Board, or disagreements concerning the respective powers of the two, the advice of the Governor-in-Council might be sought.

These are merely a few broad outlines; there are many matters not dealt with, and others might require amendment in the light of practical difficulties. The above details are only given to illustrate the general principle of the proposal, the main object of which is to eliminate the danger of political interference, without removing public safeguards.

One possible difficulty is that representatives of railway users might make difficulties in cases of raising rates. For this reason it is essential that the power of making rates should be in the hands of the Commissioner, and that the Board should only have power to review, which would give the necessary safeguard. It is assumed that the Commissioner is charged with the duty of making revenue meet all expenditure, and he must decide the ways of raising the revenue.

But it would be desirable in any case that the representatives of shippers should not be in a majority. If two representatives of Government Departments and an economist were appointed, together with three representatives of shippers, the Commissioner would have the casting vote. If only two official members were appointed, it would be necessary to diminish the number of representatives also, or to give the Commissioner a deliberative as well as a casting vote. In any case the representatives of the various interests must not be delegates; they must be appointed by the Governor-in-Council. Were they elected, they would sooner or later acquire "the audacity of elected persons", which is the very thing the proposal seeks to avoid. At present railway users (and persons seeking contracts) are able to bring pressure to bear on the Minister to get their way; they must not be able to do the same with members of the Board.

APPENDIX XIV.VICTORIAN ROYAL COMMISSION'S REPORT.

The Victorian Royal Commission, to which reference has been made from time to time, was appointed in April 1928 and delivered its report in December. The terms of reference were fairly broad, and included a general enquiry into the finances of the railways, the administration and its efficiency, the steps necessary to control motor competition, and a number of other matters. The findings of the Commission on some of the matters mentioned in the text of the thesis are briefly reviewed below in the order in which they appear in the report.

(a) Motor Competition.

The report makes out about the same case as is made out in Section XI, pointing out the advantages of road transport in some directions, particularly the advantage of not having to pay for the construction and maintenance of roads. It also points out a number of other factors that have diverted traffic from the railways, such as tramway extensions, and the supply of electricity from Yallourn, which has diminished the quantity of coal carried. It considers competitive transport wasteful, but thinks that the complete merging of transport interests is impossible.

It recommends in order to bring about some measure of co-ordination that a Ministry of Transport be constituted, having control over the Victorian Railways, the Melbourne and Metropolitan Tramways, the Melbourne Harbour Trust, and road motor transport. The Minister of Transport would have full charge of the registration, licencing and regulation of motor traffic. It is further recommended that a Transport Board be created with one representative of each of the bodies interested, namely the Railways Commissioners, the Tramways Board, the Harbour Trust, the Country Roads Board, and the commercial and private motor owners, to be appointed by the Governor-in-Council.

This Board should regard transport as an economic unit, and its function should be to investigate and report to the

Minister on matters relating to transport and the co-ordination of transport, as it might think fit. But it was felt that the proposed Board should not usurp any of the functions of any body charged with the management of a utility, unless the Minister orders it to do so in the interests of co-ordination.

This recommendation seems to have some of the elements of elasticity needed in dealing with a constantly changing problem. Hard and fast rules cannot be laid down, and a Board of this type would be able to adapt regulations to the needs of the moment, providing it was given enough power. But here, as in the case of the Board recommended for the Tasmanian railways in the previous appendix, care would have to be taken in defining the powers of the Board, so that it would not encroach on the autonomy of any of the bodies controlling transport agencies, as for instance the Railways Commissioners, on the onehand, and yet on the other have power enough to be effective. This would require a delicate adjustment.

(b) The Railway Budget.

The Commission had before it the report of the Acworth Commission on the Indian Railways, and also took evidence from Sir Basil Blackett, Finance Member of the Government of India, on the working of the Acworth Commission's recommendation for the separation of railway finances from the general budget. The report quotes extensively from the Acworth report and Sir Basil's evidence, setting the case out similarly to Sub-section (c) of Section XIII above, and recommends that the finances of the Victorian Railways be separated from the State Budget, at the same time making it incumbent on the Commissioners to see that their expenditure does not exceed their revenue. This is not to apply to loan money,

(c) Over-Capitalisation.

The recommendations concerning the over-capitalisation of the railways is interesting. The Commission has used the

same methods as the Railways Commissioners of valuing the plant (See Section X, Par.41), but has "after careful consideration" brought their estimate of £16.35mill. fictitious capital down to £15mill.

But the Commission has taken into consideration the matter of discounts and floating charges on loans, on which comment was made on Par.42 of Section X. This was stated (in the paragraph mentioned of this thesis) to be £2.58mill., but the Commission found that the portion of this to be allocated to expired loans and expired portions of existing loans to be £1.57mill.. They recommended that this should be added to the amount to be written off making the total £16.57mill., or slightly higher than the estimate of the Commissioners.

So far one must agree with the report, but then comes an astounding counter-account. The balance sheet of the Railways has an item of £4.13mill. contributed from revenue for capital purposes, £3mill. being proceeds from the sale of State lands and £1mill. a contribution from Consolidated Revenue. The Commission recommends that this also should be eliminated from the balance sheet, leaving £12.44mill. as the sum from which the Railways should be relieved.

The Commission appears to have overlooked two things, namely, that they have previously in their report recommended that there should be an annual provision of £727,000 for depreciation, which is new expenditure, and that they expect the Commissioners to make revenue meet all expenditure. They have certainly also recommended that the Railways be relieved of an annual charge of £289,000 for superannuation, but they still admit that on the average earnings of the past ten years there is £50,000 to be made up. They reckon on the provision of a depreciation fund relieving expenditure on maintenance, which it naturally will, at least to some extent, but they seem to be a little too enthusiastic in stating that there is "no reason why the Department, with the adoption of suggestions for economies made in this Report should not pay its way, build up the suggested reserve fund, and eventually decrease X

freights and fares."

(d) Relief from All Interest Charges.

An interesting proposal was put before the Commission by Mr. H. A. Pitt, the Under-Treasurer, backed by two members of Parliament. This was to the effect that the Railways should be relieved of all interest charges, amounting to £3mill., making it possible to reduce freights and fares by 25 per cent. It was contended that land values all over the State, in the metropolitan area as well as in country districts, had been raised by the building of the railways. Therefore, the money required to pay these interest charges ought to be raised by a tax on the unimproved value of land.

The idea is not unattractive, and would really only be an extension of the existing "betterment" tax in Victoria. There is a great deal in the contention that our State railways subsidise ownership at the expense of enterprise, and the tax would be just and not easy to shift. It would certainly tend to discourage extravagant construction, and would make the real gainer contribute some part of his gain. It would also be an excellent method of equalising the costs of the Railways and road motors, who are not now paying for road construction.

The proposal put forward by Mr. Pitt showed that a tax of 3d. in the pound on unimproved land values would yield the required amount, but he recommended that the tax should be imposed gradually at the rate of ½d. per year until the full amount became operative. The Commission considered the proposal a political matter, and refrained from making a recommendation.

The remaining recommendations of the Commission include only minor matters, or matters not within the scope of this thesis.

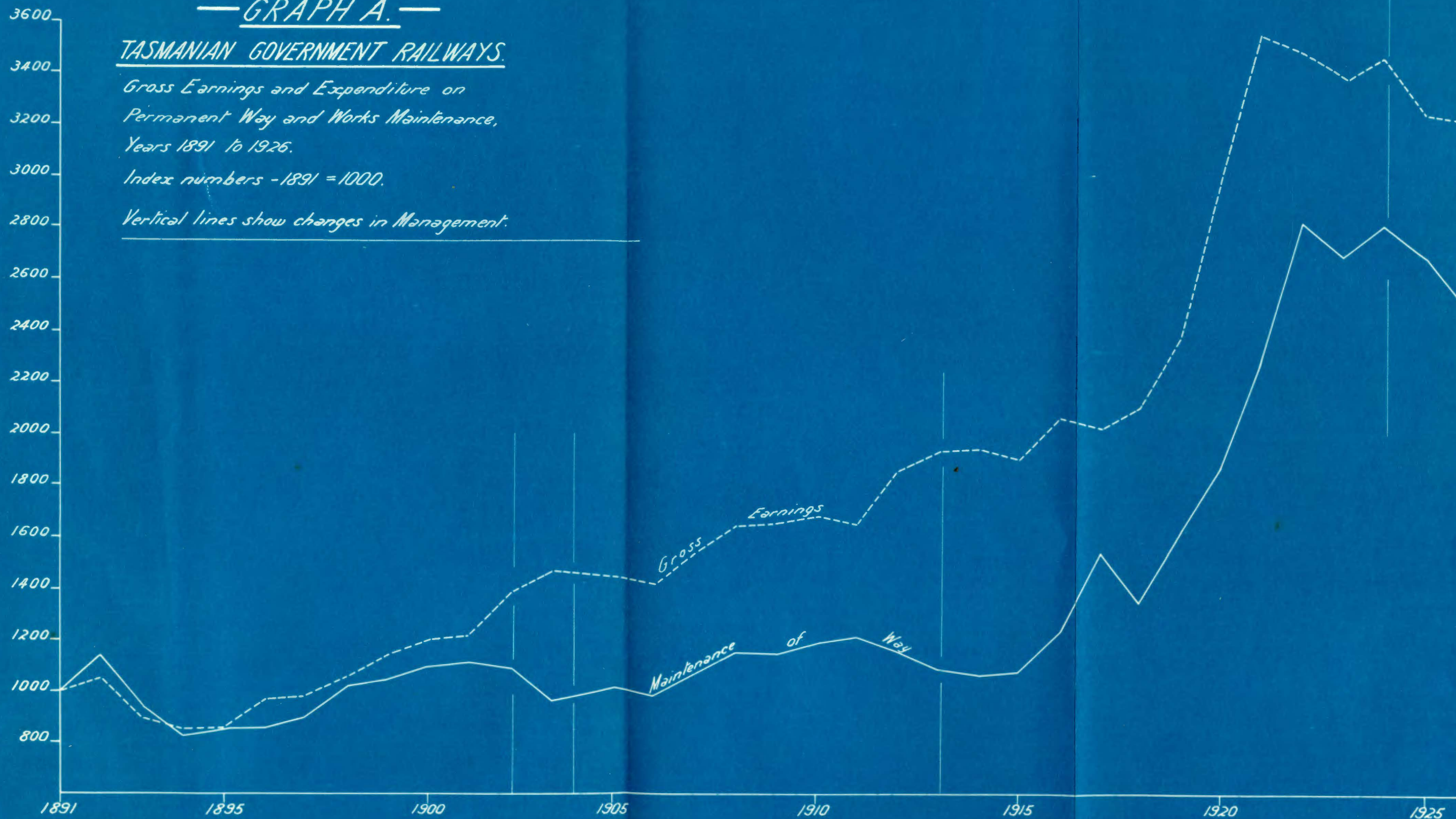
—GRAPH "A."—

TASMANIAN GOVERNMENT RAILWAYS.

*Gross Earnings and Expenditure on
Permanent Way and Works Maintenance,
Years 1891 to 1926.*

Index numbers - 1891 = 1000.

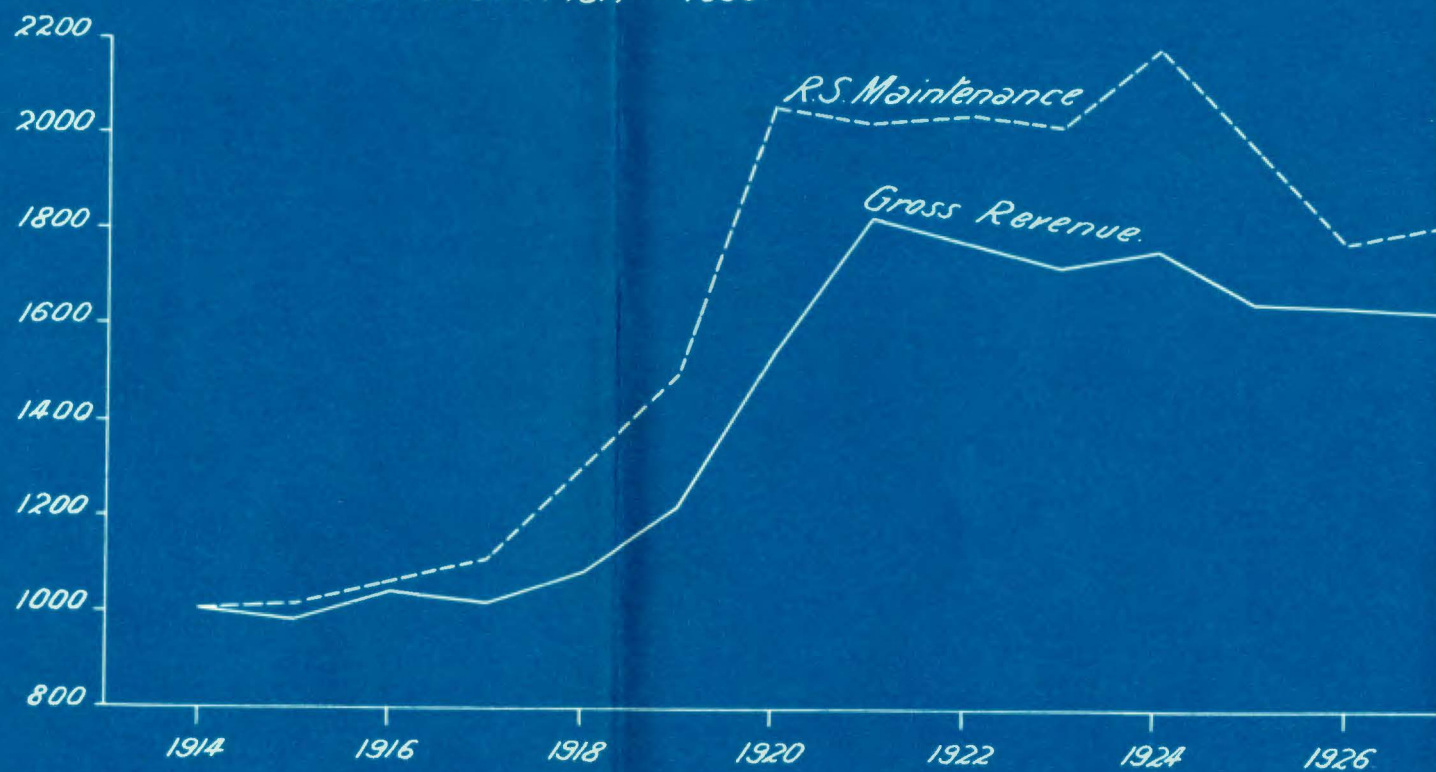
Vertical lines show changes in Management.



— GRAPH "B" —

*Rolling Stock Maintenance
compared to Gross Revenue
Tasmanian Government Railways.*

Index Numbers: 1914 = 1000.



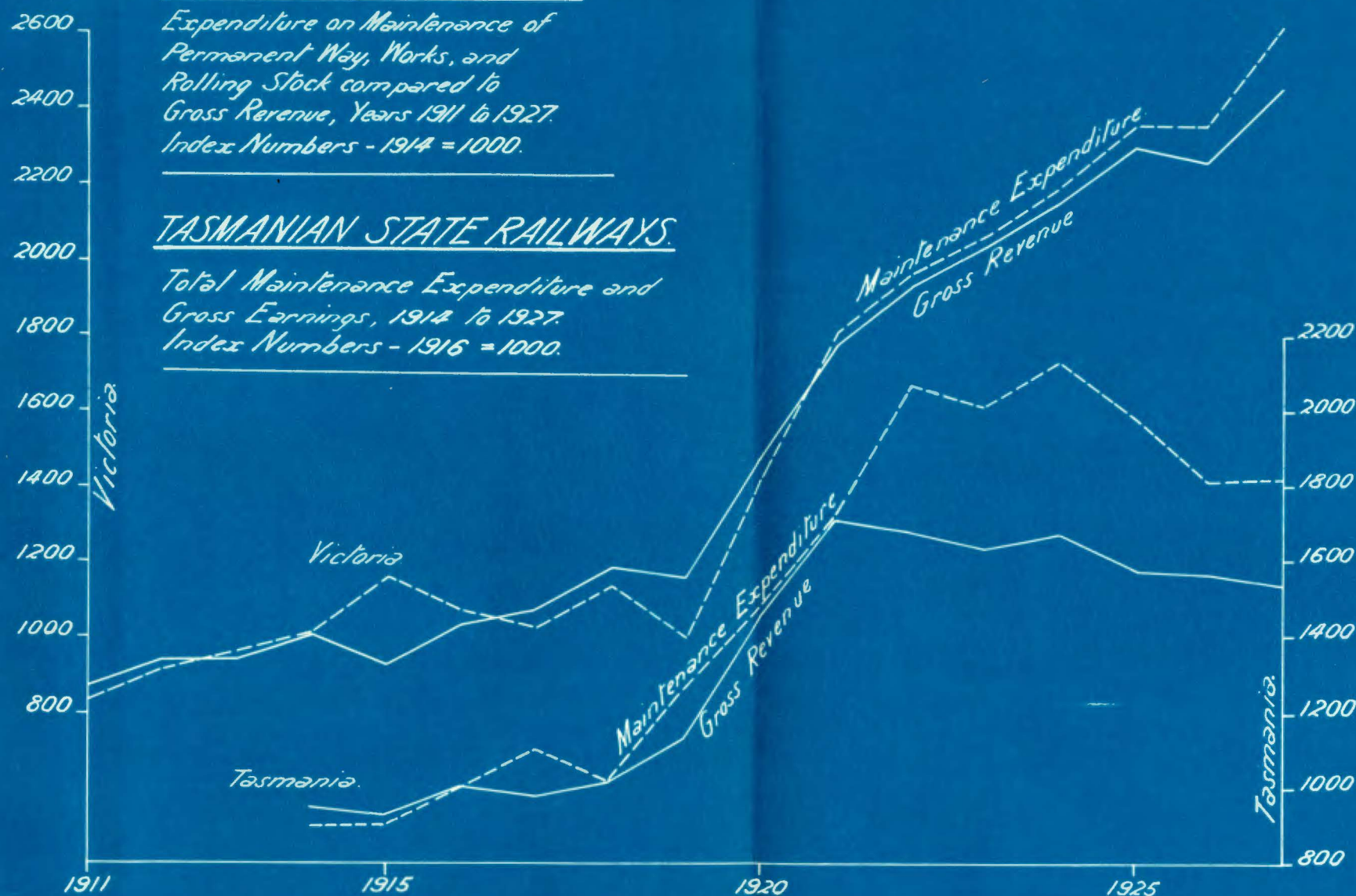
— GRAPH "C." —

VICTORIAN RAILWAYS

*Expenditure on Maintenance of
Permanent Way, Works, and
Rolling Stock compared to
Gross Revenue, Years 1911 to 1927.
Index Numbers - 1914 = 1000.*

TASMANIAN STATE RAILWAYS

*Total Maintenance Expenditure and
Gross Earnings, 1914 to 1927.
Index Numbers - 1916 = 1000.*



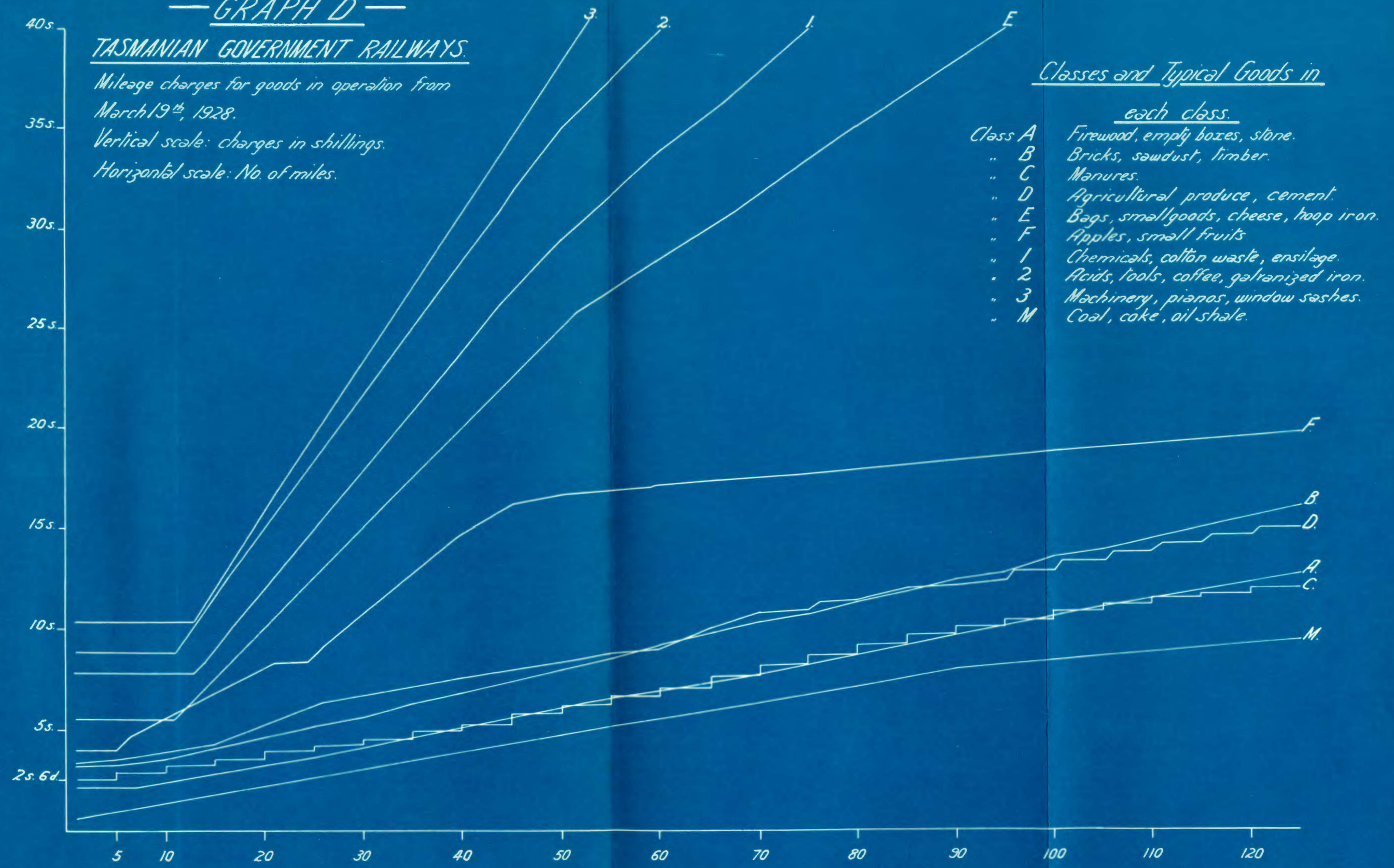
—GRAPH "D"—

TASMANIAN GOVERNMENT RAILWAYS.

Mileage charges for goods in operation from
March 19th, 1928.

Vertical scale: charges in shillings.

Horizontal scale: No. of miles.



Classes and Typical Goods in each class.

- Class A Firewood, empty boxes, stone.
- " B Bricks, sawdust, timber.
- " C Manures.
- " D Agricultural produce, cement.
- " E Bags, small goods, cheese, hoop iron.
- " F Apples, small fruits.
- " 1 Chemicals, cotton waste, ensilage.
- " 2 Acids, tools, coffee, galvanized iron.
- " 3 Machinery, pianos, window sashes.
- " M Coal, coke, oil shale.

—GRAPH "E."—

VICTORIAN RAILWAYS.

Goods Charges per Ton.

*Class B. Victoria and N.S.W.
combined, showing the effect
on rates of crossing border
191 miles from starting point.*

80 shillings

75
70
65
60
55
50
45
40
35
30
25
20
15
10
5 sh.

10 20 40 60 80 100 120 140 160 180 200 220 240 250

*B. rate Vic. 191 miles
+ B rate N.S.W. 59 m.*

B.

Bb.

A.

Aa.

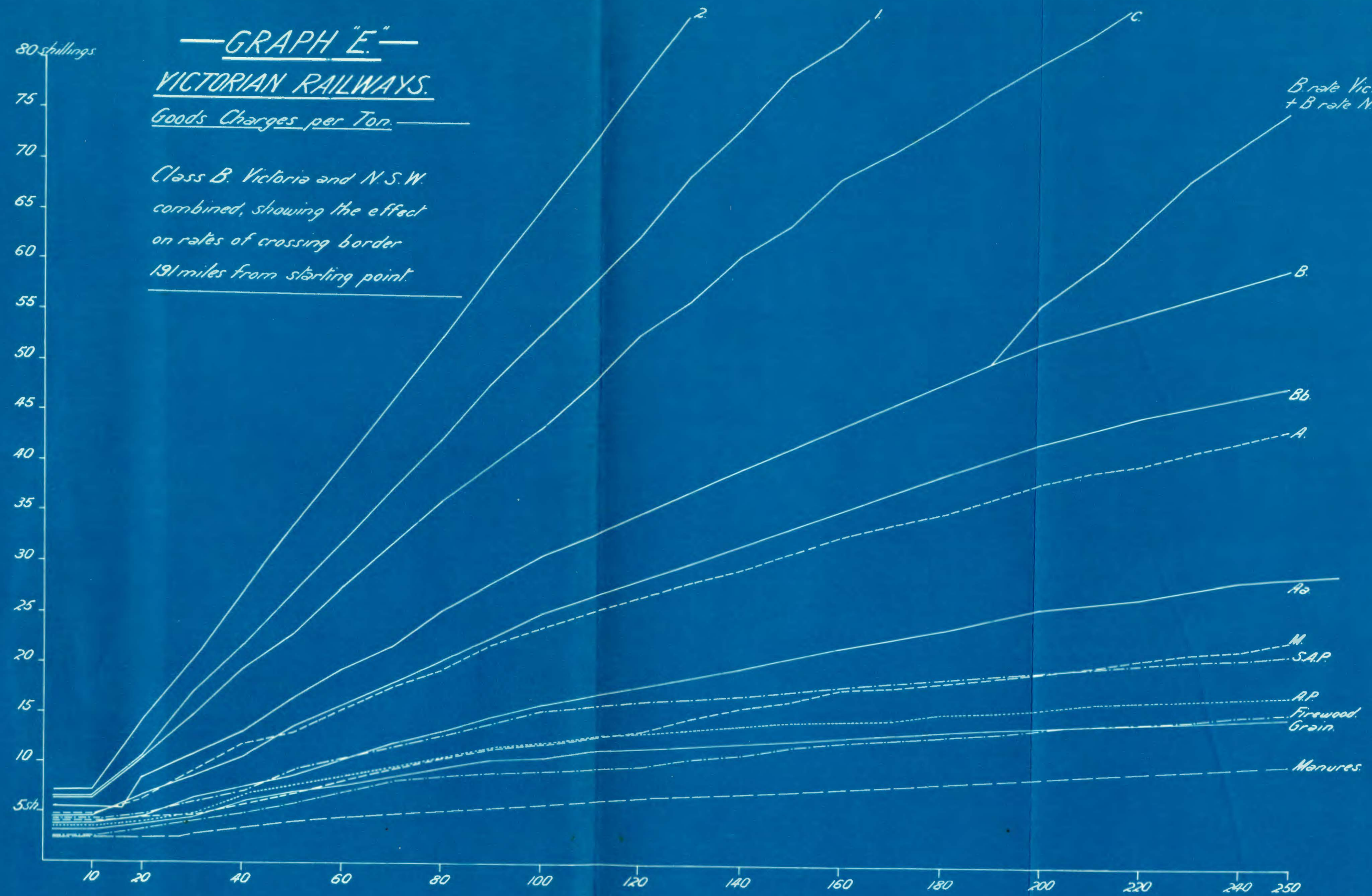
M.

S.A.P.

A.P.

Firewood.
Grain.

Manures.



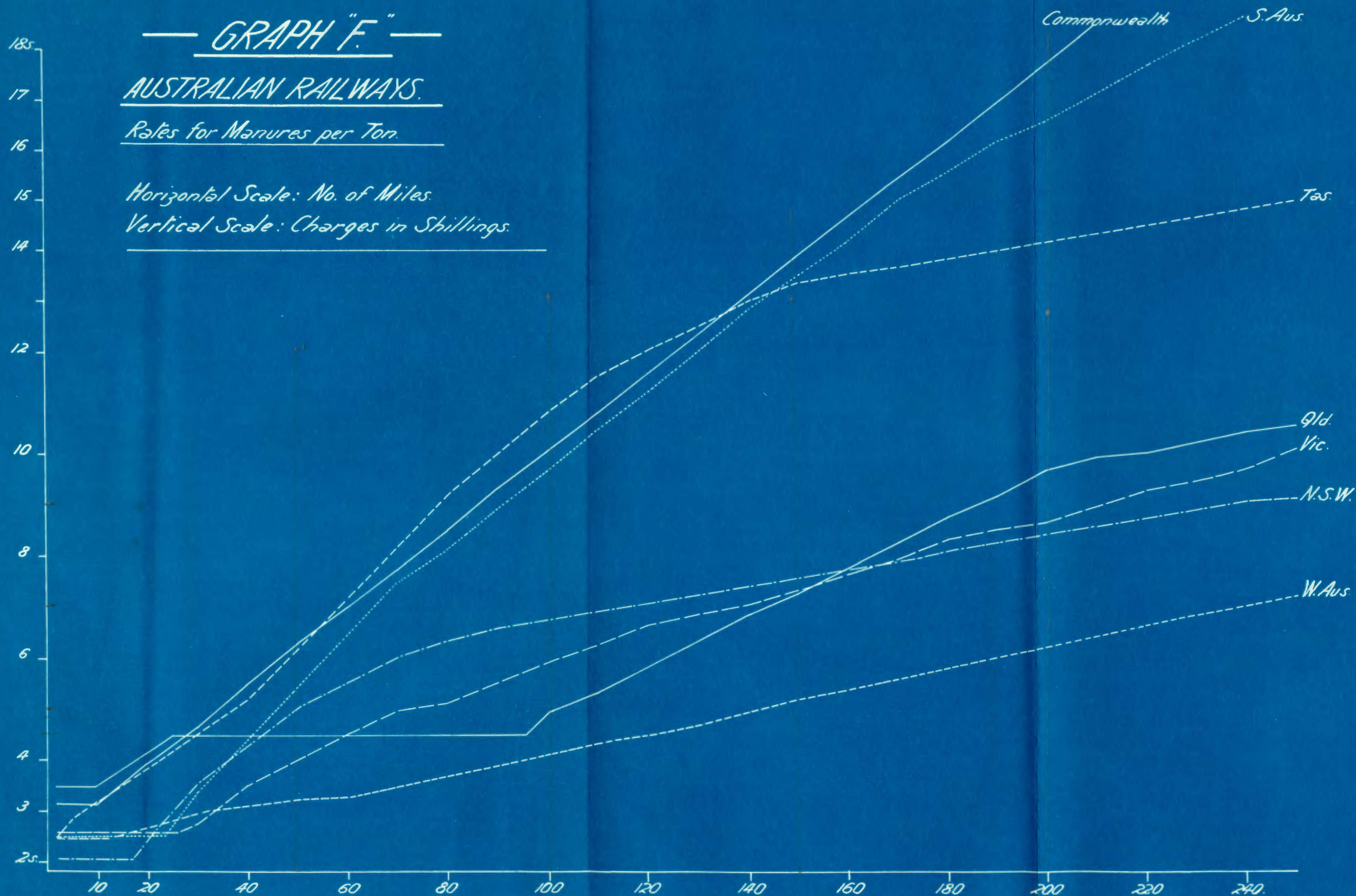
— GRAPH "F." —

AUSTRALIAN RAILWAYS.

Rates for Manures per Ton.

Horizontal Scale: No. of Miles.

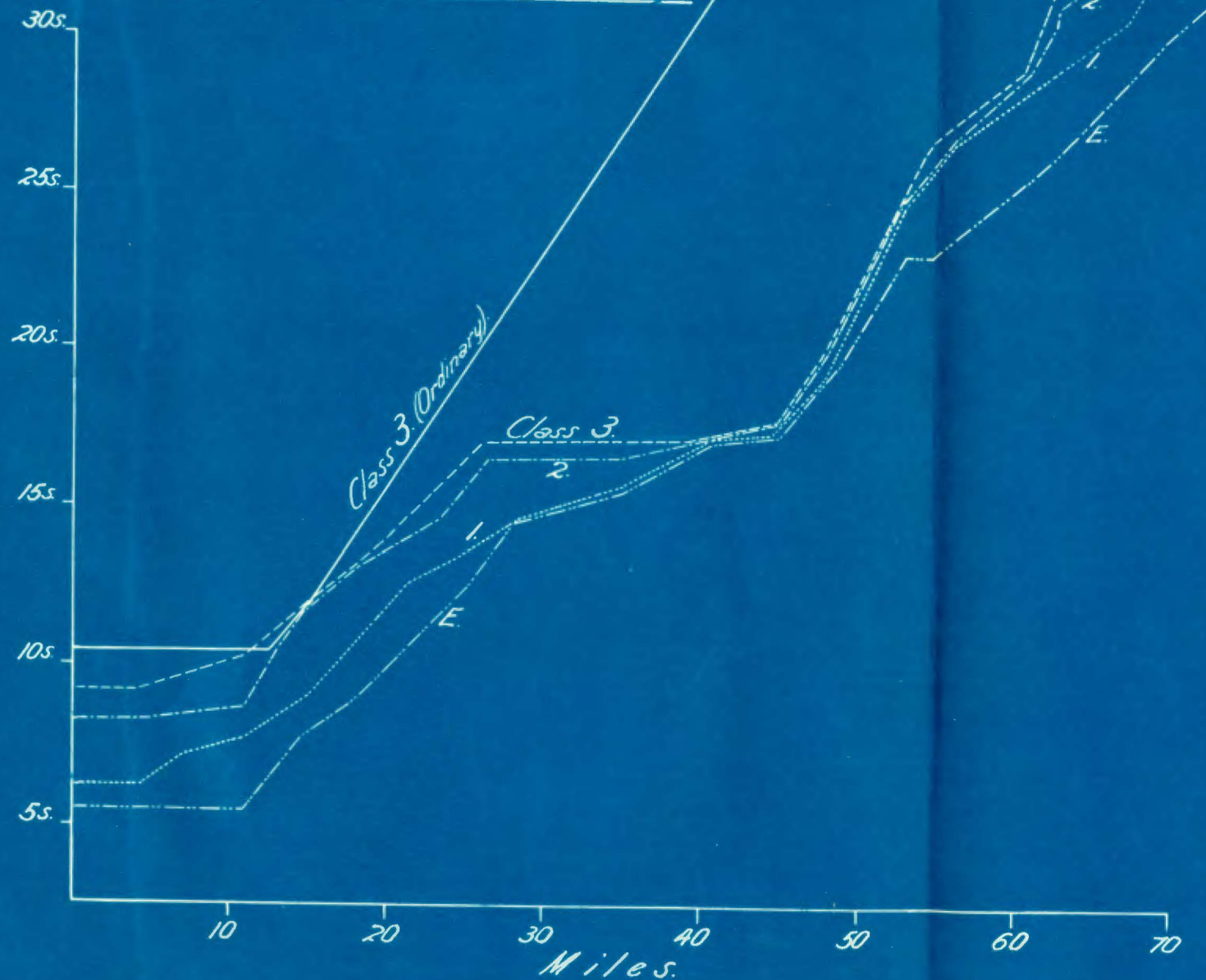
Vertical Scale: Charges in Shillings.



— GRAPH "G." —

The Effects of Competition of Tasmanian Rates.

- (1) Effect of motor competition on rates on the Western Line between Launceston and Dawsons (72 miles). Note how the rates converge at 40 miles. This point can be reached in 25 miles by good road, and is the first point at which road and rail meet after leaving Launceston. The continuous black line shows Class 3 rates when not affected by competition.



NOTE: These graphs should be compared with Graph "D", which shows ordinary rates not affected by competition, and is drawn to the same scale.

- (2) The effect of water competition at one point (New Norfolk, 25 miles). There is a maximum of 7s. at this point, and ordinary rates to intermediate points, and to points beyond New Norfolk. Five classes benefit, the rates for other classes being below 7s. at 25 miles.

